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THE EARLY EVOLUTION OF LAND VERTEBRATES

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(*Read November 11, 1955*)

IN THE study of any animal form—whether our interest be in relationships, structure, function, behavior, or what not—knowledge of its evolutionary history is necessary for adequate comprehension of its nature. The history of the vertebrates is of particular interest to us since we are members of this group. In studying their evolution we are fortunate in being able to avail ourselves of paleontological evidence. In the case of many an animal phylum, the fossil record of its origin is inadequately known because of its high antiquity or because its members may lack hard structures capable of being preserved. The vertebrates are in a happier position. Although their pedigree stretches back for several hundred million years, they are, relatively, a young group, and there are, covering this period of time, abundant deposits in which fossil vertebrates might be present. Further, at a very early stage in their history, most vertebrates acquired bony skeletons which may be readily preserved. Paleontologists have been active since the days of Cuvier, a century and a half ago, and much has been discovered. Our knowledge is, however, far from complete, and even many important steps in this evolutionary progression are inadequately known.

One such major step is that by which vertebrates emerged from water on to land, passing from the fish stage through that of amphibians to the reptiles (from which evolved the final vertebrate groups, the birds and mammals). The shift from the life of a fish, at home in his watery medium, to that of even such a lowly land animal as a lizard or turtle involves so many major changes in form, function and habits that many a writer on evolution has despaired of accounting for it by natural evolutionary processes, and has fallen back on supernatural explanations. In consequence, it is of the highest importance that we know something of the actual fossil forms which effected this transition—what was their structure, what their mode of life as they passed from one major life environment into the other. Despite many interesting discoveries made in paleontology during the 1800's, our fossil record of the early evolution of land vertebrates remained very inadequate throughout this period. Study of this problem has interested me for many years and

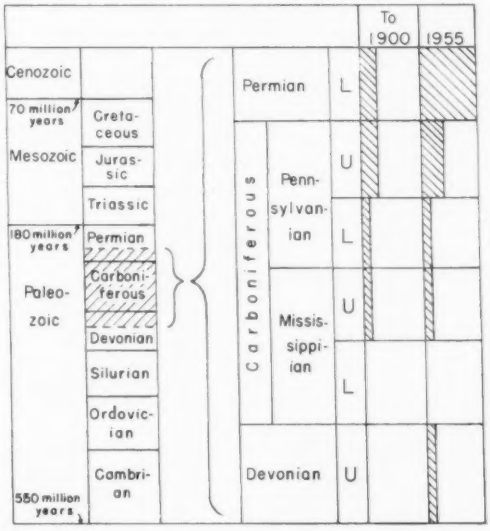

FIG. 1. At left, a simplified table of geologic time subdivisions since the beginning of an abundant fossil record. In the first column, the three major eras, with estimated time since the beginning of each era. In the second column, the periods into which the Paleozoic and Mesozoic eras are subdivided. The general period of time during which land vertebrates developed is hatched in this second column, and this section of the column is shown enlarged in the right hand portion of the diagram. In the column headed "To 1900" I have roughly indicated for each geologic subdivision, by hatching a fraction of each square, how much data regarding tetrapods was then available. From the final column may be seen the advances to 1955; these are mainly discovery of late Devonian amphibians, and a much more adequate (although, of course, far from perfect) knowledge of early Permian forms.

I propose to outline some of the advances that have been made during the past half century.

First, to pin down the general period of geologic time concerned (fig. 1). The time span from the age of deposition of the oldest rocks containing a good fossil record, on to the present is about 550,000,000 years, according to current estimates based on disintegration of radioactive elements in ancient rocks. This is divided into three major eras. It is with the oldest of these, the Paleozoic era, that we are concerned. This era is customarily divided into half a dozen periods. The first three of these contain little vertebrate life. The fourth, the Devonian period, shows at its beginnings only lowly forms of fish life, but by its close there had developed higher fishes from which amphibians might have arisen. Following the Devonian period came the Carboniferous—generally subdivided in America into two parts, the Mississippian and Pennsylvanian, the latter the time of deposition of the great swamp deposits which are our major source of coal. Ending the Paleozoic is the shorter Permian period. By the later part of the Permian, reptiles were well established and diversified; it is thus between the late Devonian and early Permian that our search for ancestral land vertebrates must lie.

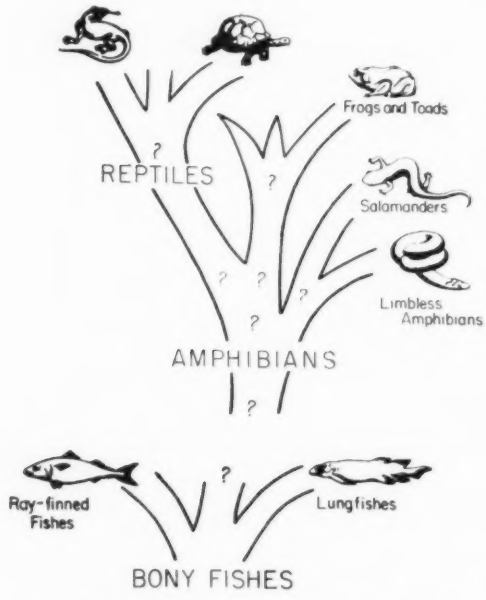

FIG. 2. A diagram to show, in crude fashion, our lack of adequate knowledge of tetrapod evolution half a century ago. Living fishes, amphibians, and reptiles are shown on the "branches" of the family "tree"; our knowledge of fossil connecting types was fragmentary and uncertain. Advances in our knowledge are shown diagrammatically in figures 10, 14, 17, and 19.

FIG. 3. A typical Devonian crossopterygian (*Osteolepis*). (After Traquair.)

But before pursuing further our quest of fossils, let us examine the living forms of the groups concerned, to see whether they—or rather their close relatives—could represent the actual ancestors. Of living higher bony fishes (as far as they were known half a century ago) all belong to two groups of very unequal size. Most are of the so-called ray-finned type—the Actinopterygii—to which all our familiar game and food fishes belong. These forms are very successful as fish, but it has long been universally agreed that they are so different, in every structure, from what we would expect in the ancestor of an amphibian or higher land vertebrate that they are out of the picture. The other group of living bony fishes is that of the lungfishes, or Dipnoi; three such forms, and three only, are found today, one in each tropical continent. They are much closer to the amphibians in their embryology and in certain features of their soft anatomy (such as the presence of lungs, to which their popular name refers). But their skeleton, skull, and dentition—of odd fan-shaped tooth-plates—are all so peculiar that it is now, I think, universally agreed that they are not amphibian ancestors. They are at best to be considered as related in some way to those ancestors, occupying, so to speak, not a parental but an avuncular position.

These living fish, then, are not direct participants in our story. What of the modern amphibians? As a class the Amphibia are a half-way stage between fish and true land-dwelling reptiles. But the living amphibians seem even more aberrant from the central evolutionary story than the living fishes. The most familiar forms, the frogs and toads, are in almost every respect one of the most highly specialized types found among land vertebrates. Even farther afield lie certain tropical worm-like

amphibians—the Apoda—which are obviously a degenerate side line. In general body proportions a third and final group of modern amphibians, the Urodela—newts and salamanders—appear closer to the heart's desire. But closer study of them is disappointing, for in their skeletons they are obviously degenerate, and in the structure of their backbone and various other features are obviously far off the evolutionary main line.

Nor do we find among living reptiles any forms which appear to be at all close to our ideal of the ancestral reptilian stock which first definitely left the water behind to become true land types. Turtles, lizards, snakes, crocodilians—all living forms are highly specialized in one way or another.

We must, then, turn to the fossil record to gain a proper picture of the early evolution of land vertebrates. At the beginning of the present century, however, this picture was almost non-existent. We were uncertain as to the nature of the ancestral fish group. From the Carboniferous and early Permian a variety of amphibians—and even reptiles—had been reported; but most of them were known from such fragmentary material that little could be made out as to their true nature and relationships. In somewhat crude fashion I have indicated this situation in figure 2 by placing the living forms on the branches of a "family tree" filled with nothing but question marks. In succeeding diagrams I will attempt to follow increases in our knowledge by gradually adding to the tree evidence in the form of adequately known fossil types.

First, as to the problem of fish ancestors for the land vertebrates. As we have seen, we must turn to fossil forms for such ancestors. During the early decades of the century attention became fixed—principally through the work of Goodrich, Gregory and Watson—on the group of advanced fishes known as the Crossopterygii (fig. 3). These fishes first appeared in early Devonian days, became abundant in the later part of that period, and then decreased in numbers during the Carboniferous; the last survivor of the typical crossopterygians comes from the early Permian. Crossopterygians show many of the features to be expected in the ancestor of land forms. The skeleton of the paired fins, as demonstrated by Gregory, is, alone among fish types, of a pattern from which the paired limbs of four-footed animals—the tetrapods—can be reasonably derived. The backbone, it is currently realized, is of a sort expected in a tetrapod ancestor. Still further, many of the skull bones, as seen in figure 4, can be identified with comparable elements in land animals—even in many cases, with those persisting today in man. A number of years ago I studied the braincase of a fossil crossopterygian by making serial sections—thin slices of the fossil made by grinding down the skull by successive fractions of a millimeter—and then re-

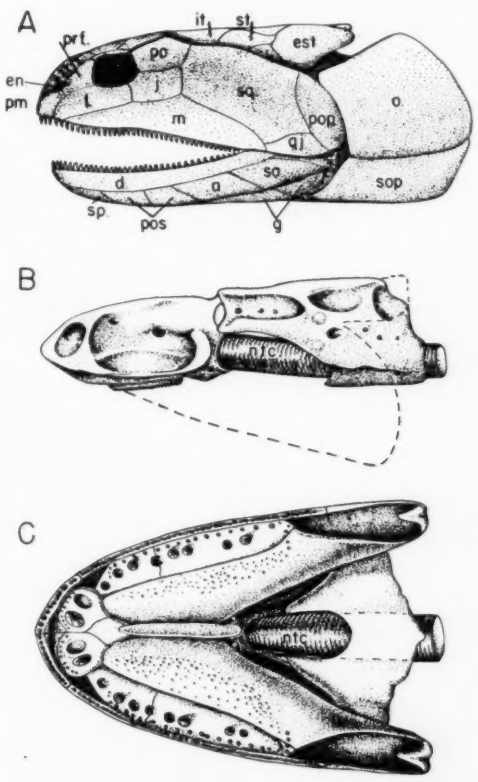

FIG. 4. The skull of typical crossopterygians. *A*, a side view of the skull, jaw and gill cover. Many of the bony elements can be directly compared with those of land animals (such as *m*, maxilla, *d*, dentary, etc.). *B*, the braincase, centrally situated in the skull. In crossopterygians this is divided into two distinct halves, front and back; the notochord (restored, *ntc*) plunged forward through a canal in the posterior segment and ran onward to attach to the front moiety. *C*, a ventral view of the skull. At the back the notochord is seen running forward through the posterior part of the braincase.

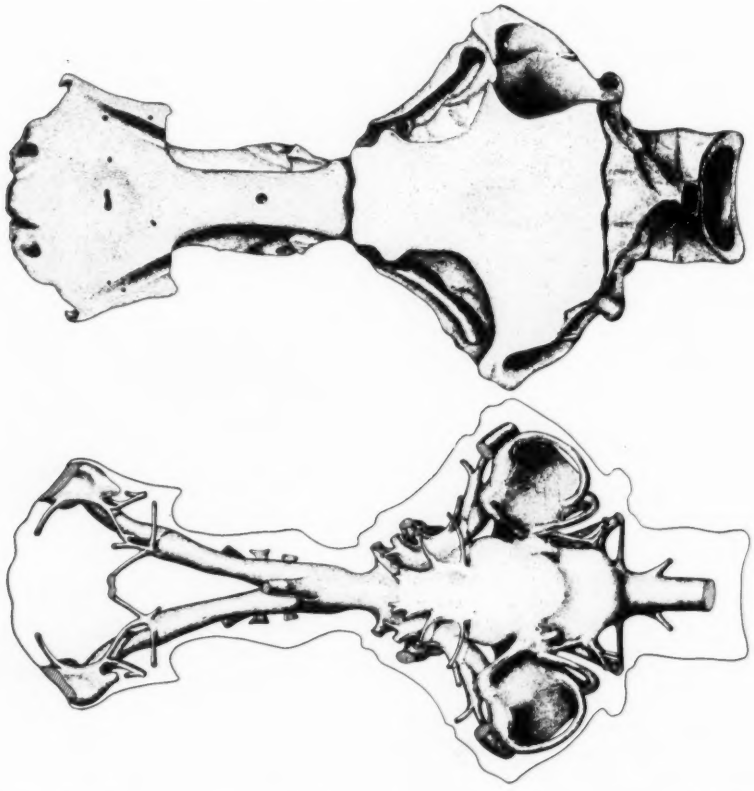

FIG. 5. *Above*, a crossopterygian braincase, seen from above; the front end at the left. *Below*, a reconstructed "cast," based on serial sections, of the internal cavities, showing the brain cavity, nerve and vascular canals, the internal ear canals, etc.

constructing its internal anatomy (fig. 5). The structures found—including the brain cavity, blood vessels and nerve channels and internal ear—were highly comparable to those of amphibians.

But before fully accepting the crossopterygians as actual ancestors, two problems remained. Early vertebrates possessed, in addition to paired eyes, a third, "pineal" eye, of much smaller dimensions, looking upward from the skull roof. In later times this eye became, so to speak, unfashionable, and few living types have retained it; it was present, however, in both crossopterygians and early amphibians. But there appeared to be a curious contradiction in its position in the two groups (fig. 6). In early amphibians it lies between a pair of bones which we know to be identical with those termed parietals in man and mammals. In crossopterygians, in contrast, this eye is farther forward, between bones which appeared to be comparable not to the parietals, but to the frontal bones of land animals. How could this contradiction be solved? A variety of explanations was offered, none satisfactory. In the 30's I had the clue to the situation but (shame on me!) failed to realize it. In comparing the crossopterygian skull with that of lungfish, I pointed out that the bones in a posterior row assigned to the skull roof (including that identified with the postparietal of land vertebrates) were not skull bones at all, but merely enlarged scales of the "neck" region. It remained for an English worker, Westoll, to utilize this clue and

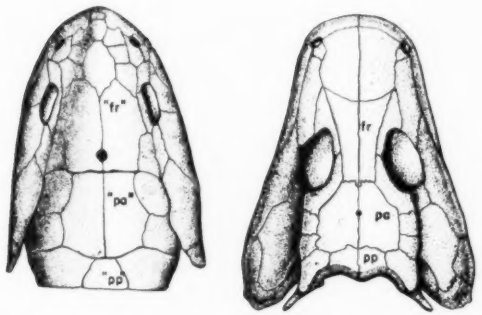

FIG. 6. *Left*, dorsal view of the skull roof of a crossopterygian; *right*, a comparable view of a fairly primitive amphibian. In the amphibian, the frontal and parietal bones (*fr, pa*) are identifiable with the similar elements in all later land animals; the postparietal (*pp*) is an element found at the back of the skull in most early land vertebrates. In land vertebrates the opening for the small "pineal" eye is found between the parietal bones; in the crossopterygians, in seeming contrast, it lies between bones which appear to be the frontals.

solve the problem.[1] If this row of bones be "counted out," then the back row of both fish and amphibian includes the postparietal, and it is in both cases the next bone forward which is the true parietal element. It is thus the parietals, actually, between which in both cases the third eye emerges. The seeming contrast is due to a shift in skull proportions in the series fish-amphibian-reptile, and if, instead of "jumping" from one major stage to a succeeding one, transitional forms be included, the comparison is clear (fig. 7).

One further stumbling block remained. Beneath the skull roof of a typical lower vertebrate lies the long low braincase, enclosing the small brain. In all typical early amphibians the braincase ossifies as a unit (fig. 8), and the same build is found in nearly every fish group. In this regard the crossopterygians appear to be highly aberrant, for the braincase forms in two very distinct pieces, fore and aft, the two readily movable on each other (fig. 4B, C). The notochord, a long flexible supporting structure running down the back, is prominent in lower chordates but in typical vertebrates is vestigial or absent beyond the embryonic stage. In crossopterygians, most remarkably, it is extraordinarily large in the adult, and runs forward through a skull canal to bind together the two braincase halves.

Here is, then, a most unusual type of braincase, peculiar to crossopterygians, of which there is no trace in a typical land vertebrate. One is loathe to believe, without clear evidence, in reversals of evolutionary trends. Could such an odd and seemingly quite aberrant structure have developed in amphibian ancestors and then have disappeared again?

Such, however, appears to be the case. No typical amphibian shows in its skull this braincase joint or the canal for the notochord. But in the skulls of the oldest known amphibians (discussed further on in this account), there is now known to persist the canal for the notochord; and while there is no free movement between front and back halves of the braincase, the point of former movement is clearly shown by a prominent suture (fig. 8).[2]

We cannot leave the crossopterygians without mention of the curious story of *Latimeria* (although this may be known to many readers). As was said above, the typical crossopterygians

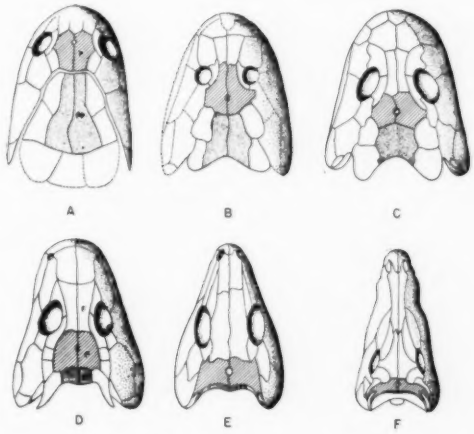

FIG. 7. The solution of the problem of seeming shift of the "pineal" eye. If we follow a series of evolutionary stages from a crossopterygian (*A*) through very primitive amphibians (*B, C*), a typical Carboniferous form (*D*) as shown in figure 6 and, finally, early reptiles (*E, F*), it will be seen that the supposed frontal of the crossopterygian (hatched) is actually the true parietal. There has been no shift of the "pineal" eye, but a gradual shift in bone positions.

[1] Westoll, T. S., Ancestry of the tetrapods, *Nature* **141**: 127–128, 1938. Romer, A. S., Notes on the crossopterygian hyomandibular and braincase, *Jour. Morphol.* **69**: 141–160, 1941.

[2] Jarvik, E., The oldest tetrapods and their forerunners, *Scientific Monthly* **80**: 141–154, 1955.

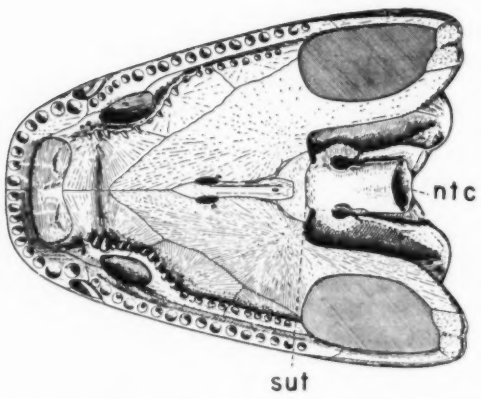

FIG. 8. A ventral view of the skull of a very primitive Devonian amphibian, for comparison with figure 4C. Front and hind halves of the braincase are, in contrast with crossopterygians, firmly united, but there is a prominent suture (*sut*) at the point of connection of the two halves, and a large canal (*ntc*) for an enlarged notochord, as in crossopterygians. (After Jarvik.)

became extinct in early Permian times. It has long been known, however, that an aberrant side branch of the crossopterygians, termed coelacanths, survived much later, although in the process they had shifted their environment from fresh waters to the seas, and obviously had become much modified in structure. Numerous fossil remains of coelacanths are known from beds as late as the Cretaceous period (fig. 9B). But even the youngest of such fossils is perhaps 70,000,000 years old; not a trace of such a form has ever been found in any later rocks. Hence I and many other writers have, with seeming reason, emphasized the fact that crossopterygians are, and long have been, quite extinct.

One can imagine, therefore, the surprise of those interested in fishes, when, just before the Second World War, there was described a specimen of a living coelacanth, fished off the coast of South Africa (fig. 9A)![3] After the war's termination, search was made for further material, and the home of this "living fossil" was found in deep waters off the Comoro Islands in the Indian Ocean. The gap in the fossil record of the group is presumably due to the fact that they have long been confined to ocean depths from which sediments able to preserve them as fossils are seldom recovered. A splendid series of specimens of these forms is now in the hands of Professor Millot of Paris. Their study is sure to reveal many interesting anatomical and functional features. But in their shift in life habits from fresh waters to the deep ocean, the coelacanths have obviously become highly modified, and in many ways they have surely drifted far in both structure and function from the ancient ancestors of land forms.

We have in the crossopterygians evidence of a group which is, we feel confident, to be placed definitely in a position ancestral to land vertebrates, and in figure 10 I have modified my earlier thumb-nail phylogeny of tetrapods by replacing the basal question mark in the "tree" by a crossopterygian. To continue the task of filling out our phylogeny, we will now turn to the opposite extreme. By the early Permian, not only had amphibian evolution become well advanced, but there was even a flourishing fauna of primitive reptiles. It would at first seem as if there were no point in looking this late for actors in our story. But we find, throughout earth history, that a given type does not always become extinct once it has given rise to more advanced forms; frequently members of ancestral groups linger on into later ages. This is the case in the Permian; there are survivors of groups which flourished in the

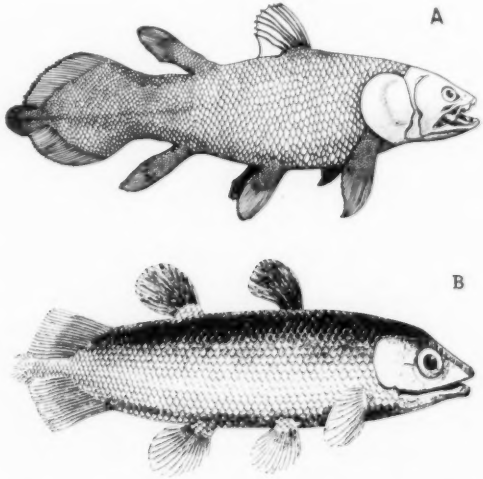

FIG. 9. *A*, the surviving coelacanth *Latimeria* (after Smith). *B*, a fossil Mesozoic coelacanth crossopterygian (after Smith Woodward).

[3] Smith, J. L. B., A living coelacanth fish from South Africa, *Trans. Roy. Soc. South Africa* **28**: 1–106, 1939.

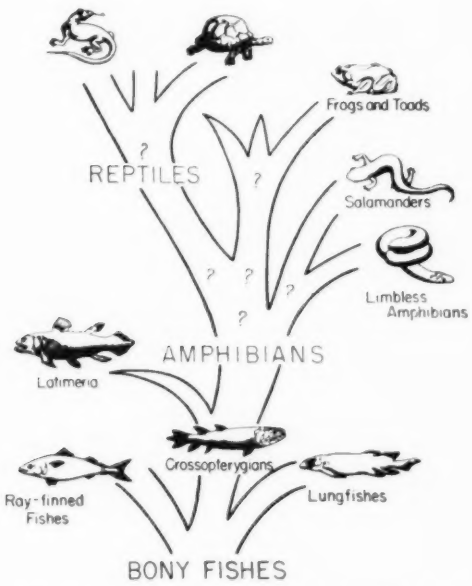

FIG. 10. The family tree of figure 2, modified by the addition of the crossopterygians.

Carboniferous and thus give us testimony as to earlier chapters in our story.

In the American Southwest, and particularly in northern Texas, there are vast areas of beds of a predominantly red color which have produced—and still produce—a wealth of well-preserved fossil vertebrates. Cope, Case, Williston, and I are among those who have gathered

FIG. 11. A restoration of *Seymouria*, a Permian form essentially intermediate between reptiles and amphibians. (After Gregory.)

and studied these remains. From such studies it became clear that the truly ancestral reptiles were not members of any of the groups extant today, or even of those which flourished in the Mesozoic era, the great Age of Reptiles. Rather, the ancestral types are members of an archaic group scientifically known by the cumbersome (and, actually, meaningless) name of Cotylosauria, but usually termed simply "Stem Reptiles." These obviously had their roots in the Carboniferous, but were still abundant at the beginning of Permian times.

Most interesting of Stem Reptiles is *Seymouria* (fig. 11), a small stubby-legged form which in its structure almost exactly bridges the gap between early amphibians and early reptiles; so close, indeed, is it to this boundary that certain of us who work in this field sometimes say that we shift *Seymouria* from one class to the other and back weekly! The basic difference between amphibians and reptiles lies not in structure but in the mode of development. Amphibians typically lay eggs in the water, fish-fashion; reptiles lay a shelled egg on land. The Museum of Comparative Zoology collections at Harvard contain a Permian egg of this latter type (fig. 12), which is by far the oldest known; but who laid it we do not know. At any rate, *Seymouria* comes close to filling the bill of a "missing link" that is no longer missing.

Amphibian evolution had progressed to a moderate degree by lower Permian times. Nevertheless, the typical amphibians of the day, belonging to a great extinct group known from their complicated tooth structure as the Labyrinthodontia, show a rather primitive build. Thanks to the labors of Williston and Case, among others, we have an adequate knowledge of various of these early Permian forms, of

FIG. 12. The oldest known reptilian egg. From the Museum of Comparative Zoology collections.

which *Eryops* (fig. 13) is typical. No living amphibians are directly descended from any of the better known Permian genera, but most (although not all) workers believe that as a whole these Permian types represent a group from which the frogs and toads may have descended.

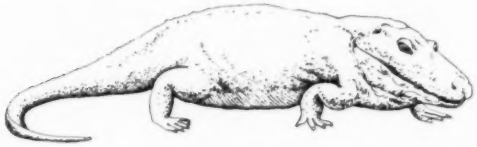

FIG. 13. A restoration of *Eryops*, a large, clumsy Permian amphibian.

Studies of the Permian, then, have filled fairly well some terminal portions of our family tree (fig. 14). But it is obvious from the figure that a great gap existed still between crossopterygian ancestors and Permian amphibian descendants. To attempt to fill this, study of earlier Carboniferous fossils was necessary. During (roughly) the middle third of the last century a considerable number of Carboniferous amphibian remains had been discovered, both in Europe and America. They had, however, contributed little to the main evolutionary story. Most were fragmentary in nature, and, crushed flat in slabs of coal shale, they were difficult to decipher. Several decades ago Watson undertook further careful study of this material. There resulted from this work a series of papers[4] which have been of immense value in our later work on amphibians. He clearly demonstrated certain major trends in the history of the class as a whole, but particularly emphasized the importance of an amphibian group, common in the Carboniferous, known as the Embolomeri (the name referring to an unusual type of backbone construction). The embolomeres, he pointed out, show certain points indicative of relation to reptile ancestors, and on the other hand there are many features which suggest that we are dealing with amphibians of a very archaic nature.

[4] Watson, D. M. S., The structure, evolution and origin of the Amphibia, the "orders" Rhachitomi and Stereospondyli, *Phil. Trans. Roy. Soc. London* **(B) 209**: 1–72, 1919; The evolution and origin of the Amphibia, *Phil. Trans. Roy. Soc. London* **214**: 189–257, 1926; The Carboniferous Amphibia of Scotland, *Pal. Hungarica* 1: 219–252, 1929.

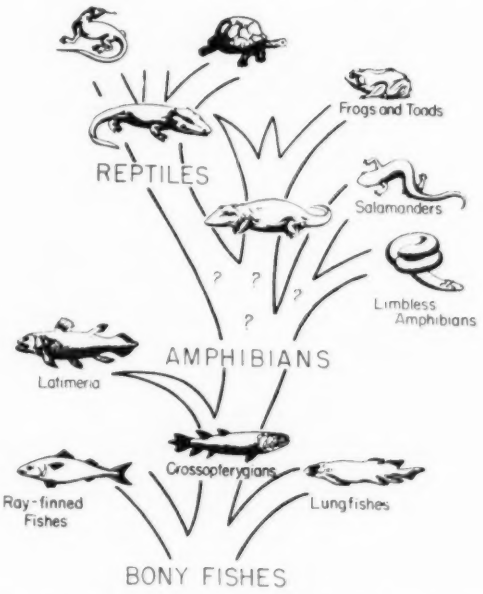

FIG. 14. The family tree of figure 10, modified by the addition of *Seymouria* and a typical Permian labyrinthodont.

Obviously the embolomeres were, thus, forms of great interest for our story. But despite Watson's careful work, the poorness of the Carboniferous material available to him, left much in doubt. In figure 15 I have reproduced his figure of the maximum extent to which he was able to piece together the structure of a Carboniferous embolomere. One specimen showed much of the backbone—but lacked most of the tail. A type of skull found in the same English coal mine could be reasonably associated with this column. The pelvic girdle is hypothetical. A shoulder girdle added by Watson to the restoration is of dubious association; quite possibly it is that of a fish. And of the limbs—highly important in studying the evolution of four-footed land animals—hardly a scrap was available.

FIG. 15. An attempted restoration of a Carboniferous embolomere. (From Watson.)

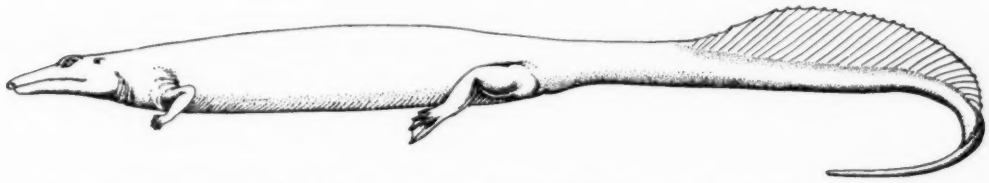

FIG. 16. A sketch restoration of *Archeria*, an early Permian embolomere. Details of the tail fin are uncertain.

Could further knowledge be gained of embolomere structure, despite the paucity of evidence from the Carboniferous days in which the group flourished? Here again hope lay in further work on the Texas redbeds. It had long been known that a last surviving embolmere was present in these early Permian deposits, for some rather poor material of this sort had been found by early collectors there. It was at the time of the publication of Watson's major paper on this subject that I first began work in the Texas Permian, and with youthful optimism I dreamed dreams of promptly finding splendid skeletons of this animal—*Archeria*, by name. As usual with young dreams, I was disappointed. For twelve successive seasons I found no remains of this embolomere of the slightest importance. I had given up hope by the time when, just before the war, our field party was excavating a quarry containing abundant material of reptiles and amphibians of more prosaic types. Then, at the end of the season, at the back of the quarry, remains of *Archeria* began to appear! The war and various other circumstances delayed collection and preparation, but today there are available some five articulated skeletons and numerous additional skulls, jaws and other remains from this one quarry. I hope to publish the results of their study shortly. Except for certain details of the toes and tail structure nearly the entire anatomy of the animal can be determined. A sketch of its general appearance is given in figure 16. (An interesting superficial feature is the fact that the tail preserved an expanded fin with bony supports in somewhat fish-like fashion, but details are uncertain and the outline sketched is quite hypothetical.)

Study of this material amply confirms Watson's belief that *Archeria* and his relatives retain many exceedingly primitive characters and, further, show indications of relationships to reptiles. Currently, however, study of vertebral evolution suggests strongly that the backbone structure seen in the embolomeres is off the main line, and in adding the embolomeres to our family tree (fig. 17) I have placed them on a spur well down the reptilian "branch."

One final piece of important evidence on early tetrapod evolution has come to light as the result of Danish exploration of East Greenland. Professor Stensiö of Stockholm and his associates, the late Dr. Säve-Söderbergh and Dr. Jarvik, have been concerned in the collection and study of vertebrate fossil material from these inhospitable shores. Very late Devonian deposits were found in one region, and in 1932 it was announced that these beds contained, as well as fishes, remains of the oldest known amphibians![5]

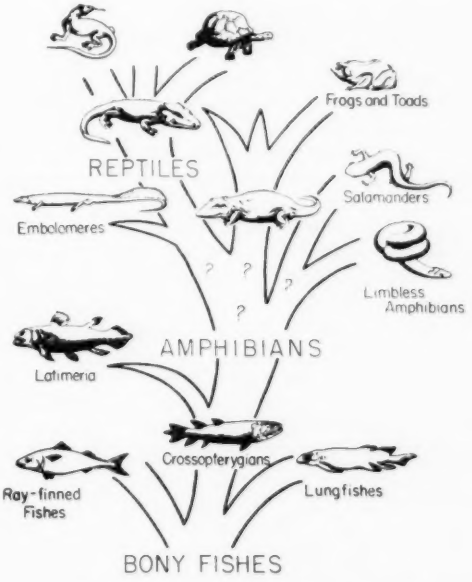

FIG. 17. The family tree of figure 14, with the embolomeres added.

[5] Säve-Söderbergh, G., Preliminary note on Devonian stegocephalians from East Greenland, *Meddel. om Grønland* **94**, nr. 7, 107 pp., 1932.

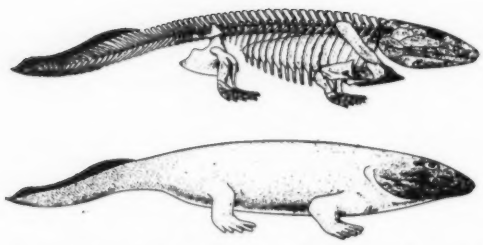

FIG. 18. *Above*, the skeleton of a Devonian ichthyostegid amphibian; *below*, a sketch restoration of its probable appearance in life. (From Jarvik.)

Little was described at that time except the skull roof. Subsequent collecting and preparation have revealed much of the skeleton of amphibians of a very archaic type indeed (fig. 18). Only brief preliminary reports have so far been published,[6] and a more comprehensive account is eagerly awaited. The limbs are already of the tetrapod pattern, rather than fish-like paired fins, but are short and much more primitive in structure than in later true land forms. The backbone is of a type reasonably comparable with that of crossopterygians, on the one hand, and many later amphibians, on the other. The tail (as in the much later *Archeria*) preserves something of the expansion of the ancestral fish tail fin. The skull (as mentioned earlier) is surprisingly primitive in retaining—unlike any later amphibian whatever—notable traces of the peculiar internal structures seen in crossopterygians. Only in certain features of the skull roof pattern do the East Greenland forms appear to deviate somewhat from our ideal of a truly ancestral tetrapod. And so, in adding the ichthyostegids (as they are termed) to our diagram in figure 19, we shall place them slightly off the "trunk" of our family tree, but only very slightly off. Almost never do we find in the fossil record, the exact specific form directly connecting two major groups—the laws of chance are strongly against us. Here, however, we are rather surely dealing with forms giving us a very close approximation to the desired central type.

If, now, we compare our present knowledge of early tetrapod evolution as simplified in this last sketch, with the situation represented in figure 2, it will be seen that in the past half century we have made great progress. No evolutionary story is ever completed; we can only make closer and closer approximations. In one regard, however, the results are disappointing. The actual Carboniferous story is still a partial blank. We have no satisfactory intermediates between the archaic stage represented by the East Greenland Devonian genera and the considerably higher types represented by the progressive Permian labyrinthodonts and by the embolomeres. And little can even yet be said regarding the pedigree of the modern salamanders and worm-like amphibians, although some small Carboniferous forms are perhaps related; in fact, their ancestry is so doubtful that Jarvik suggests that they may have evolved quite separately from crossopterygians.

More knowledge is needed, then, of Carboniferous amphibians. Can it be obtained? A fair amount of material of that age was described during the last century; little has been reported since. It seems certain that further fossils are to be had from the Coal Measures. But it is equally certain that they are not easily found, or else we would have had more reports of chance finds in the course of geological exploration and mining activities.

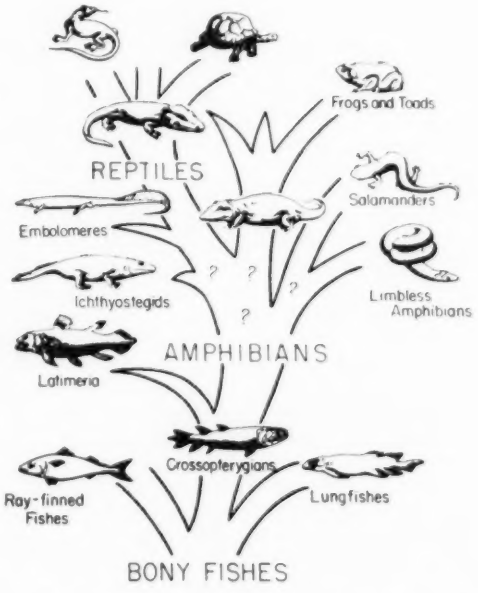

FIG. 19. The family tree of figure 17, with the Devonian ichthyostegids added.

[6] Jarvik, E., On the fish-like tail in the ichthyostegid stegocephalians, *Medd. om Grønland* **114**, nr. 12, 90 pp., 1952; *op. cit.*, 1955.

Thorough work in the exploration of the Carboniferous is, thus, needed if we are to continue to advance our knowledge of tetrapod evolution. With this in mind, I sent out last year, under a grant from the National Science Foundation, three teams of two young men each, to spend the summer in the Carboniferous regions of the Appalachians (mainly in Pennsylvania and West Virginia), with instructions to look at every rock outcrop, every coal mine dump, in search of fossil vertebrates. It was possible that they would find nothing; possible that they would "hit the jack pot" and discover a rich amphibian deposit; but still more probable that their results would lie between these two extremes—as, indeed proved to be the case. Much time was, as expected, spent in dreary examination of barren rocks. But in a number of places modest finds were made; and an interesting discovery was that of amphibian remains—although unfortunately very fragmentary remains—in deposits of the Pocono Series, at the base of the Carboniferous System. This is by far the oldest find of amphibian material in the world, apart from the East Greenland finds. These results are definitely encouraging. We shall conduct a second search this year, and, I hope, may continue further. It is highly improbable that we shall thereby "solve" the problem of the Carboniferous evolution of land vertebrates. But one can at least modestly hope that this work may contribute to some degree in clarifying our picture of the ascent of the vertebrates on to the land.

THE FESTIVAL CYCLE IN A NORTH INDIAN JĀṬ VILLAGE*

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DESPITE the abundant literature available on Hindu festivals and ceremonial life, there are relatively few systematic accounts of the festival cycle followed in a specific community. The authors of most works on the subject have tried to be inclusive and cast a wide net, listing and describing the festivals observed in different parts of India, or within a particular region.[1] There are also studies like those of Briggs[2] and Fuchs[3] which describe the festivals observed by a particular caste, but here again the region covered is wide, and the cycle is not pinned to a specific town or village. Local differences are widespread in a broad area like Uttar Pradesh or Mahārāṣṭra. In considering a particular community one would like to know which festivals are absent and what local festivals have developed there; overall surveys do not supply this information. Any analysis of Indian festivals, whether it be historical or functional, should be based upon descriptions of the ceremonial cycle followed in a variety of specific communities. Until we have such data, it will not be possible to assess the role of the Hindu festivals in Indian life and the varying degrees of integration in different localities between the "great" and "little" traditions of Hinduism. McKim Marriott has recently dealt with this theme in a paper which does focus on a specific community—the village of Kishan Garhi in Aligarh District, Uttar Pradesh;[4] but while this is an excellent work of scholarship and analysis, it does not supply a systematic detailed account of the festival cycle as a whole. In another recent work S. C. Dube has described the festival cycle of the village Shamirpet in Hyderabad, but his description, although valuable, is necessarily brief; the author disclaims the attempt to give minute ethnographic details concerning the festivals.[5]

The present paper is devoted to the description and analysis of the yearly festival cycle followed in Rāmpur, a Jāṭ village in Delhi State, about fifteen miles west of Delhi on the Rohtak side.[6] The cultural affinities of this community are with the Punjab, although Rāmpur also has much in

* This study was part of a larger study of Rāmpur village in Delhi District carried out by the writer between October 1952 and June 1953 under the auspices of the Evaluation Organization, National Planning Commission, Government of India. The data were gathered between February and June 1953, with the aid of my research assistant, Mr. Indera Paul Singh, now Instructor in Anthropology, Delhi University. The study was based upon interviews with 45 informants, 32 males and 13 females, selected to represent the major castes as follows: 20 Jāṭs, 11 Camārs, 6 Brahmāns, 4 Kumhārs, 3 Bhaṅgīs, 1 Khātī. About a third of the festivals were observed by the field party.

I am grateful to my colleague, Dr. Barnouw, for his valuable collaboration in the library research and the writing of this paper. Thanks are due to the Graduate Research Board of the University of Illinois for bringing Dr. Barnouw to the University as Research Associate in Anthropology. I am also indebted to the Behavioral Sciences Division of the Ford Foundation, New York, for a grant-in-aid in 1952, part of which supported the field work in India. Finally, I would like to thank Dr. McKim Marriott for his critical reading and comments on this paper.

[1] Stevenson, Mrs. Sinclair, *The rites of the twice born*, London, Oxford Univ. Press, 1920. Gupte, Rai Bahadur B.A., *Hindu holidays and ceremonials*, Calcutta, Thacker, Spink, 1919. Underhill, M. M., *The Hindu religious year*, London, Oxford Univ. Press, 1921. Mukerji, Abhay Charan, *Hindu fasts and feasts*, Allahabad, Indian Press, 1918. *An alphabetical list of the feasts and holidays of the Hindus and Muhammadans*, Calcutta, Imperial Record Department, 1914. The latter deals largely with Bengal. Stevenson's focus is on Kāthiāwār and Gujarāt, while Underhill gives some emphasis to Mahārāṣṭra. Gupte's data come principally from Bengal, Bombay, and Central India, while Mukerji's seem to come from Bengal and Uttar Pradesh.

[2] Briggs, George, *The Chamārs*, London, Oxford Univ. Press, 1920.

[3] Fuchs, Stephen, *The children of Hari*, New York, Praeger, 1951.

[4] Marriott, McKim, Little communities in an indigenous civilization, *Village India*, 171–222, Chicago, Univ. of Chicago Press, 1955.

[5] Dube, S. C., *Indian village*, 98, Ithaca, Cornell Univ. Press, 1955.

[6] It is two miles off the main Delhi-Fazilka road with which it is connected by a cart track. The village can also be reached from the Delhi-Ferozpur railway line. Gheora and Nangloi, the two nearest railway stations, are at a distance of a few miles. The village has a total area of 784 acres.

common with the villages in Uttar Pradesh described by the Wisers[7] and by Marriott[8] and shares in the great Hindu tradition found throughout India. However, an analysis of Rāmpur religious practices shows the persistence of many elements that are not derived from the Sanskritic Hindu tradition, and which are not Muslim. This may seem surprising in view of Rāmpur's proximity to the capital, but it reflects a characteristic of the Punjab that was singled out by Rose in 1919:

> In the earliest days of Hinduism the people of the Punjab proper were a bye-word in the mouths of the worshippers of Brahma, and Brahmaism has always been weaker there than perhaps in any other part of India. Neither Islam nor the Hindu religion has ever been able to expel from the lives of the people the customs and superstitions which they brought with them from the homes of their ancestors; and the worship of godlings unknown to the Hindu pantheon, the social customs which still survive in full force among the majority of the nominal adherents of either religion, and the peculiar cults of the inferior and outcast races, offer for investigation an almost virgin field full of the richest promise.[9]

There are no temples in Rāmpur, although there are some small local shrines in honor of such deities as Bhuiyān, Gurgāon-wālī Mātā, and Gūgā pīr. There is, however, a temple to Siva (built fifty years ago by a Baniyā money-lender) in the nearby village of Rasulpur, a member of the four-village complex which includes Rāmpur.

Brāhmans are weakly represented at Rāmpur and do not have the high status which the Brāhmans enjoy, for example, in Karimpur, the village studied by the Wisers. The Wisers have not given us a description of the ceremonial cycle in Karimpur,[10] but one would expect to find a greater stress on Hindu orthodoxy there than in Rāmpur, where the Jāṭs are the dominant land-owning group. Jāṭs own all the lands of the village, and all Jāṭs are landowners. The caste composition by families at Rāmpur is as follows: 78 Jāṭ families, 20 Camār (leather-workers), 15 Brāhman, 10 Bhaṇgī (sweepers), 7 Kumhār, (potters), 5 Jhīnvar, (water-carriers), 4 Dhobī (washermen), 4 Khātī (carpenters), 3 Nāīs (barbers), 2 Chīpīs (tailors) 1 Lohār (blacksmith), and one Baniyā (merchant).[11]

After presenting our account of the village festivals, some problems suggested by our data will be examined. We will be concerned with questions such as these: What is the general role of the festivals in village social life? To what extent do they act as integrating factors? and how much community participation takes place —across caste and class lines? Is social distance lessened, or do caste distinctions persist in the festivals? Do certain castes have private festivals of their own? Do men and women participate equally in the ceremonial cycle? How may differential participation be interpreted? How are the festivals related to the economic and agricultural cycle? May they be said to act as inhibiting forces in economic production, as some writers have suggested? Do they swallow up capital for conspicuous consumption and take up time which might otherwise be spent in the fields? To what extent does the festival cycle at Rāmpur reflect the great Hindu tradition? Which elements are local, regional, national? Are the festivals stable or undergoing change? What types of change are taking place, and to what may they be attributed? Does the religious life of the villagers seem to be influenced by latter-day cults or isms coming from the outer world? What may one expect of future adherence to the ceremonial cycle? Some of these are difficult questions to answer, and our data are not always complete enough to provide full answers. But some generalizations may be drawn from the accounts that follow. Here, to begin with, is a list of the festivals observed at Rāmpur:

Festival	Month
Bāsora	Cait (March-April)
Devī-kī Karahī	Cait
Ghantal Deo	Baisākh (April-May)
Jaith-kā Dasahrā	Jaith (May-June)
Tīj	Sāvan (July-August)
Silono	Bhādon (August-September)
Janam Aṣṭamī	Bhādon
Gūga Naumī	Bhādon
Kanāgat	Asauj (September-October)
Niorthā-Dasahrā	Asauj
Karvā Cauth	Kātik (October-November)
Hoi	Kātik
Girdī-Divālī-Gobardhan	Kātik
Devuṭhāni Giās	Kātik
Ganga-Jumna Nahan	Kātik
Makar Sankrant	Poh (December-January)
Basant Pañcamī	Māgh (January-February)
Siv Rātrī	Phāgun (February-March)
Holī-Dulhendī	Phāgun

[7] Wiser, William H. and Charlotte V. Wiser, *Behind mud walls*, New York, Agricultural Missions, Inc., 1951.

[8] *Op. cit.*

[9] Rose, H. A., *A glossary of the tribes and castes of the Punjab and the north-west frontier provinces* 1: 3, Lahore, Superintendent of Government Printing, 1919.

[10] There is, however, a list of the festivals in Wiser, William H., *The Hindu Jajmani system*, 83 ff., Lucknow, Lucknow Publishing House, 1936.

[11] See Lewis, Oscar, *Group dynamics in a north Indian village*, 7, New Delhi Planning Commission, Government of India, 1954. For a fuller version of this paper, see *Economic Weekly* **6**: 423–425, 445–451, 477–482, 501–506, Bombay, 1954.

BĀSORA

The ceremonial cycle begins on the seventh day of the Hindu month of Cait (March-April) with the Stale Bread Festival or Bāsora (*bāsī*—stale).[12] The festival is also known in Rāmpur as Sidhi Satain (*sidhī*—cold, *satain*—seven), because the seventh day of Cait is supposed to mark the end of the cold season. People now stop keeping cooked food overnight, lest it go bad with the coming of warm weather. This is a time, too, when diseases are common. Some families therefore travel to Gurgāon, thirty miles from Rāmpur, to get help from Gurgāon-wālī Mātā, a goddess concerned with smallpox. Others visit a small shrine to this deity on the outskirts of Rāmpur.

On the evening of the sixth Cait, wheat porridge sweetened with brown sugar is cooked by women of the Jāṭ, Brāhman, Baniyā, and Camār castes. This food is set aside uneaten. Early the next morning, having bathed and dressed in their best clothes, the women carry the porridge, some rice, gram, and water to the goddess's shrine. They go in extended family groups, women of the same caste walking together with their youngest children, singing songs in praise of Gurgāon-wālī Mātā. "O Mātā, you gave us children; now protect them from disease!"[13]

The shrine to the goddess is rather tumbledown, little more than a pile of bricks. Here the Rāmpur womenfolk pray, facing towards Gurgāon, and pour some water onto a brick slab which represents the goddess. To this they add some porridge, rice, and gram, and a smear of turmeric. After repeating their prayers, the women move on to a shrine dedicated to Kainthīwālī Mātā, a goddess of typhoid. Here the ritual is repeated, with a turmeric mark being placed on the forehead of each child by the mother. Some of the women make vows to present a veil to the goddess or to distribute candy to all the children, if their own child recovers from sickness. This is an occasion, then, for the distribution of brown sugar and sweets to the boys and girls. A Bhaṇgī (sweeper) may bring a cock and hold it over a child's head. To have the cock flutter its wings over a child in this way is considered auspicious, conducive to long life. The Bhaṇgī is given a small tip (one pice to one anna) for this service.

Sweepers get some free food as well; their empty bowls set beside the shrine are filled with porridge by the worshippers. If a veil is left behind for the goddess, it is taken by a female sweeper attached to the woman who made the vow. Sometimes small pigs are left as offerings to the goddess, and these are also taken home by the Bhaṇgīs. So the sweeper caste derives some benefits from the festival. The Kumhārs (potters) are also given porridge on this occasion.

On the way home the women leave some more porridge at the crossroads for the Crossroads Goddess, Chaurahe-wālī Mātā, who has power over ghosts. Porridge and turmeric are also left at the shrine of Bhuiyān, the first old man to die in the village after its founding; for in this region it is the custom to worship such a man as a village god.[14] When they reach home at last, each woman pours out some water on either side of her door—a symbol of purification. Then porridge is eaten; no other food is cooked until evening.[15]

[12] Marriott calls it "leftover food worship," *op. cit.*, 192-193, 212.

[13] Some songs to Gurgāon-wālī Mātā, sung by the Bhaṇgis of Delhi, are given in Ratan, Ram, *Socio-ethnic studies of the Bhangis of Delhi*, unpublished thesis, Delhi, Delhi Univ., 1952. Here is an example:

"I go to worship Gurgaon-wālī.
Oh mother, have mercy on me.
I touch your feet and stand before you with joined hands.
Lotā is in my hand.
Dhoti is on my back."

[14] See Rose, *op. cit.*, 374.

[15] According to Abhay Charan Mukerji, cooked food is offered only to the smallpox goddess (also known as Sitala) and not to other deities. "The rule is that cooked food, carried out of the bounds of the *chowka* or cooking place, becomes ipso facto unclean, and unfit even for respectable mortal taste; hence no cooked food is ever offered in worship at any public temple, the priests alone having the privilege of supplying the deity with his usual meals at the usual hours, during which the public are shut out from the temple and visits are disallowed. But in the case of the goddess Sitala this rule, which is rigidly enforced in other cases, is relaxed, and cooked food from the hands of all castes is freely allowed to come within the sanctum of the temple." (*Op. cit.*, 62.) Ibbetson's data disagree with this: "Offerings of cooked food may be divided into two classes. To the benevolent gods, or to ancestors, only *pakki roti*, that is cakes or sweets fried in *ghi*, may be offered; while to the Malevolent and impure gods, *kachi roti*, generally consisting of *churma*, or stale bread broken up and rolled into balls with *gur* and *ghi*, is offered. Brahmans will not take the latter class of offerings." Ibbetson, Sir Denzil, *Report on the revision of settlement of the Panipat Tahsil and Karnal Parganah of the Karnal district: 1872–1880*, 145, Allahabad, Pioneer Press, 1883. According to Dube, cooked sweet potatoes are offered to Siva at his shrine in Shamirpet (*op. cit.*, 106). Apparently cooked food was offered to demons in ancient times. In the *Arthaśāstra* of Kautilya, dated at *ca.* 300 B.C., appears the statement: "In all kinds of dangers from demons, the incantation 'we offer thee cooked rice' shall be performed."

Trips to Gurgāon to honor the goddess are not made on Bāsora day itself but on any Monday that follows during the month of Cait. Here the goddess is given sweets (*laḍḍūs* and *patāsas*) rather than porridge. The trip to Gurgāon may be made to honor a pledge to the goddess—in gratitude for the birth or recovery of a child or the contraction of a satisfactory marriage. Such pilgrimages have declined in recent years. Ārya Samāj influence is given by villagers as the cause of this.[16] The men, in general, are skeptical of Mātā worship and frequently cite an Ārya Samāj argument against it: "If you put food on Mātā's shrine, a dog comes along and eats it. He also makes water there. Mātā can't stop him. If she had any power, she should kill that dog, but she does not." "Our ancestors were stupid, and we are getting educated," said one villager. "We're learning that all such beliefs are false."

Such attitudes do not seem particularly to influence the women, who still visit the local shrine. However, here too there are some signs of change. It is commonly claimed that more porridge was given to the Bhaṇgīs and Kumhārs in the past. The attitudes of both donors and recipients are said to have altered. The Jāṭs complain that the Bhaṇgīs no longer carry out their *jajmānī* obligations.[17] Why, then, should they be fed? The Bhaṇgīs, for their part, say that the porridge left in their bowls is both scanty and poor in quality. "Why should I eat it?" asked one. "It won't keep my belly full for a year." Some Bhaṇgīs and Kumhārs feed the porridge to their animals—which may reflect Ārya Samāj teachings directed against the acceptance of left-over food. The custom of holding a cock, fluttering its wings above the head of a child, is also being discontinued.

Not all villagers approve of the new tendencies. One remarked, "There is no *dharma* left in the world; nobody works for us, and so we don't do what we should." A Kumhār observed that formerly even animals had enough to eat; nowadays people starve. This Kumhār attributed the decline in Mātā worship to the increase in population. "Formerly one went to worship Mātā to get more children or to keep those that one had healthy and well, but now every family has five or six children. We don't want any more. My house used to be big enough, but now we have six families in it."

The festival does not involve much expenditure; in fact one saves money on Bāsora through fasting and eating bread and porridge. The more expensive items—sweets, veils, or pigs given to Mātā—are being dispensed with nowadays, according to some informants. But even these items would affect only some of the villagers—those who had made vows to Mātā.

The festival of Bāsora seems to show a cleavage at Rāmpur between the men and women, with the former expressing skepticism and the latter remaining faithful to the goddess. The men attribute their own attitudes to recent changes and to the influence of the Ārya Samāj. However, this interpretation is open to question, for men in this part of India have traditionally avoided involvement in certain religious ceremonies regarded as the province of the women.[18] Smallpox goddess worship belongs in this category. Both Rose and Mukerji claim that it is exclusively female in nature.[19]

Rose's account is worth quoting, since it agrees in so many points with our own data:

> These deities are never worshipped by men but only by women and children, enormous numbers of whom attend the shrines of renown on Sítala's *saptami*, the seventh of the light half of Sáwan, when only light food is eaten. Every village has its local shrine also, at which the offerings are all impure.

[16] The Ārya Samāj is a Hindu reform movement started in the second half of the 19th century by Swāmī Dayānanda Sarasvatī, with the slogan "Back to the Vedas."

[17] ". . . the priest, bard, accountant, goldsmith, florist, vegetable grower, etc. etc., are served by all of the other castes. They are the jajmans of these other castes. In turn each of these castes has a form of service to perform for the others. In this manner the various castes of a Hindu village in North India are interrelated in a service capacity. . . . Each has his own clientele comprising of members of different castes which is his 'jajmani' or 'birt.' This system of interrelatedness in service within the Hindu community is called the Hindu 'Jajmani system.'" Wiser, *op. cit.*, 10, 1936.

[18] Ibbetson, Sir Denzil, *Census report for the Punjab for 1881*, Part I, 101, Lahore, Superintendent of Government Printing, 1883. O'Malley, L. S. S., *Popular Hinduism*, 104, Cambridge, Cambridge Univ. Press, 1935.

[19] Mukerji also claims that it is largely a lower-caste practice: "It must be pointed out that Mother-worship in these rather gross forms is confined exclusively to the female folk of the lower castes. These Mother-goddesses are the most popular deities of Northern India, in the sense that they are publicly worshipped oftener than any other gods or goddesses" (*op. cit.*, 63).

In Rāmpur Jāṭ, Brāhman, and Baniyā women take part in the worship of these deities. One Jāṭ informant, however, said that higher caste women worship Mātā only if they have made vows to do so during the preceding year, at the time of a smallpox epidemic. Under normal circumstances, according to this informant, no higher caste family would visit the Mātā shrine at Gurgāon.

Sītala rides upon a donkey, and gram is given to the donkey and to his master, the potter at the shrine, after having been waved over the head of the child. Fowls, pigs, goats and cocoanuts are offered, black dogs are fed, and white cocks are waved and let loose. An adult, who has recovered from small-pox, should let a pig loose to Sītala, or he will again be attacked. During an attack no offerings are made; and if the epidemic has once seized upon the village all worship is discontinued, till the disease has disappeared. But so long as she keeps her hands off it, nothing is too good for the goddess. . . ."[20]

DEVĪ-KĪ KARAHĪ

This festival is observed by the Kumhārs, Camārs, and other low caste groups, but by only about half of the Jāṭs. The first celebration is on the eighth day of Sudi-Cait (March-April); the second on the eighth of Sudi-Asauj (September-October). The main local center of the goddess Devī is in Berī, in Rohtak District. She also has a small shrine near Rāmpur. During the period of these celebrations harvests are in progress—mustard-seed in March-April and millet in September-October. Worship of the goddess is limited to the mornings and evenings. The hearth is given a new coat of plaster, a *ghī* lamp is lit, and a dish of sweets (*halvā* or *lapsī*)[21] is placed before the hearth. The mother or grandmother of the family prays, "Oh Devī, keep my children healthy!" Some of the candy is given to a cow; some is set before a Brāhman before the family partakes of it. Foods prepared for the holiday are exchanged with different families of the lineage. Among the Camārs all families prepare a small quantity of *lapsī*, but there is apt to be one Camār family which will cook a large amount of it, about 5¼ *sīrs* in weight, for distribution among the other Camār families, including those from four adjoining villages. This family does so because of a vow pledged to the goddess. If their wish is fulfilled (generally for a son or a fortunate marriage), this obligation is undertaken.

A few families from Rāmpur attend the annual fair at Berī. Devī's shrine is near a pond, whose mud is believed to be sacred. Everyone who goes to worship there digs up some mud from the bed of the pond. Offerings of sweets (*laḍḍūs* and *patāsas*) are made at the shrine, and a *ghī*-lamp is lit there. Those who have made a vow to the goddess, and whose wishes have been granted, offer from one to five rupees worth of *laḍḍūs*. Five of the sweets are left at the shrine; the rest are eaten by the worshipper or distributed among relatives.

Children born subsequent to a vow made to Devī are taken by their parents to Berī for their first haircut. The first lock of hair cut off is buried in the pond; a few hairs are placed in the shrine. This does not apply to all families, for different *gotras* honor different gods and goddesses. The Dabās Jāṭs prefer to offer the first-cut hair of a child to Ghantal Deo and to celebrate on the latter's festival day instead of on Devī's. Camārs and Kumhārs flock to Berī because of the trade in leather and donkeys there, and because of the opportunity to meet relatives from round about. There are wrestling matches, merry-go-rounds, and other such attractions.

In the past most families placed a lighted *ghī* lamp at the small local shrine at Rāmpur, but now only about twenty-five families do so. However, the women of the village generally light a lamp at home. Special foods are cooked on this day by some of the families, and as one man put it, "It's all done in the name of the goddess, but anyway our children get some good food."

GHANTAL DEO

Ghantal Deo was a bygone leader of the Dabās villagers who was cremated in Rāmpur. He has now become a god and is worshipped on the ninth of Baisākh (April-May). There is a well-kept whitewashed monument dedicated to Ghantal Deo near the primary school where Dabās from other villages also come to worship. This festival occurs at a time when the wheat crop has been harvested and the threshing has begun. Women make sweets and pancakes on this day and carry them, singing, to the shrine. Here they dig up some earth from a small pond nearby and then place a lighted earthen lamp and a food offering before the Brāhman who sits at the shrine. (He takes the food home later.)

The newborn children of most Jāṭs and Brāhmans in the village get their first haircut at the shrine on this occasion; so one or two barbers may be found there. After the haircut, the

[20] Rose, *op. cit.*, 350. See also Ibbetson, *op. cit.*, 149, 1883, for a similar passage from which Rose has probably drawn.

[21] Jāṭ families generally prepare *hālvā*, made of sugar, flour, and *ghī*, while lower castes and poor Jāṭ families make *lapsī*, consisting of toasted flour, brown sugar, and water.

parents distribute sweets among the bystanders. If a child can't be brought to the shrine, some of the hair is sent along with the offering. Some Jāṭs, however, prefer to have the first haircut done at Beri or Jharoda.

There is no special food exchange on this day, nor are any food gifts presented to the lower castes, who take no part in this holiday. Until seven or eight years ago, there used to be a fair in the village on this occasion, and people would come from many villages round about. But now only those from the four adjoining villages come to honor Ghantal Deo.

JAITH-KĀ DASAHRĀ

On the tenth day of the Sudi fortnight of Jaith (May-June) some families from Rāmpur go to bathe in the Jumna River near Delhi, to honor the river, which is conceived to be a virgin. The weather is very hot at this time. At the river leaves bearing small coins and flowers are floated downstream, and bread and gram are distributed to beggars. The Jumna is believed to wash away sins incurred in agricultural work—the beating of oxen, killing of ants, etc. Since the threshing and winnowing of crops are now over, it is a good occasion for such a purificatory bath. Informants say that this ceremonial bathing is not as widely observed as in the past.

TĪJ

Tīj, which falls on the third Sudi of the month of Sāvan, marks the beginning of an important cycle of festivals concluding with Holī. A local proverb says: "Tīj comes and sows the seeds of festivals; Holī comes and takes away the festivals in her shawl."

After the hot summer months the monsoon rains have finally come, and now the air is cool and everything is green. Millet has been planted, sugar cane cultivated, and the villagers are in good spirits. Tīj is meant to express this mood. Villagers say that the festival was started by the daughters of the ancient ruler Vikramāditya, who inaugurated the custom of swinging, the most characteristic aspect of Tīj.

On the evening before Tīj the young men go to the village common lands and look for trees on which to hang swings. Some place marks on their trees, or separate branches of trees, to claim them, while others keep watch all night to ward off rivals. Fights sometimes spring up in this competition over trees. The swings are set up early in the morning—sometimes at one A.M., but the swinging does not begin until later in the day.

Some of the young men gain reputations for their skill in putting up swings and are sought out by their sisters, sisters-in-law, cousins, and daughters of neighbors, to hang swings for them. Tīj provides more opportunities for flirtation than most festivals. If a young married woman asks her husband's younger brother or cousin to put up a swing, it shows her interest in him.

Children start to use the swings early in the morning while the men are working in the fields and the women are at home making small pancakes (*gulgulla*), rice pudding, and other festive dishes. At about noon the men come home, and all the young women and children put on their good clothes. An hour later they are off to the groves where the swings have been hung, walking in family groups, singing as they go. One or two double swings are put up for each extended family. The swings are made so that two women, each sitting on a board 1½ feet long and 5 to 6 inches wide, face each other and place their feet on the opposite swing. Two other women stand behind them and push, while others are grouped about, singing songs. Here are some of the currently popular songs sung at Tīj:

The month of Sāvan is come. Get me a swing of yellow silk rope.
O daughter-in-law, we have no yellow silk rope. Get it from your father's.
O mother-in-law, my brother has come. Send me to my father's place.
O daughter-in-law, there is work to do in the fields. Go to your father's place in Kātik.
O mother-in-law, my brother will be married in Kātik. Then I shall go for the second time.

When I took the first swing, O mother mine!
It was as if someone thundered through the sky.
There is a swing in the green garden.
When I took the second swing, in the garden green, O mother mine!
It was as if someone swung through the sky.
There is a swing in the green garden.
My head-veil flew away, O mother mine!
My seating-plank is made of black *chandan*, O mother mine!
The strings are as if made of fine silk.
There is a swing in the green garden.
O mother mine!

Towards evening, at about five o'clock, all the women go home, while the men and children

stay to watch wrestling matches between the young men of the adjoining four villages. These matches are over by sunset, and then everyone goes home to eat the festive meal. Formerly, food was given to the lower castes in the village on Tīj, but now only the Bhaṇgīs are given gifts, since they are the only ones who still work regularly for the Jāṭs.

Tīj is the time when young brides receive gifts of clothing from their fathers-in-law, especially in the case of recent brides who are still living at their parents' home on the first Tīj after the wedding. Such a girl receives from her father-in-law a shirt, veil, a skirt, some bangles, a colored rope and wooden board for a swing, eight to ten *sīrs* of sweets, and some henna to stain the palms of her hands and the soles of her feet. The bride may give some of the sweets to her brothers and sisters, nephews and nieces, but not to her parents, uncles, and aunts.

When a bride comes of age and lives at her husband's house, her father sends her *kothli*, gifts of clothing, on the first Tīj. She receives a skirt, veil, and shirt; her husband and his father and brothers each receive a cotton sheet; her husband's unmarried sisters and mother receive a skirt and veil, while the mother is also sent about five *sīrs* of special sweets, *suhali*. In a well-to-do family all the children of the husband's brother are given shirts and caps. On every subsequent Tīj, a shirt, veil, and shirt are sent to the married daughter by her father, as well as sweets and a shirt and cap for each of her children. The responsibility for sending this annual gift passes to the sons and grandsons at the father's death. The general practice now, however, is to send *kothli* for the first consecutive three or four years. After that it is sent only occasionally, especially if a man has two or three married daughters. The *Nāī* (barber) who used to deliver *kothli* to the married daughters no longer performs this role. Now the girl's brother takes the gifts to her. Some send money or money orders of two to five rupees, since money is more useful and more convenient to send. In the past the sweets were often stale upon arrival and had to be thrown away. In Rāmpur the cost of the annual *kothli* for a married daughter or the *sindhārā* for a daughter-in-law is about thirty rupees.

One of the songs sung at Tīj reflects the custom of *kothli*:

The whistle bird sings in the garden.
I know someone will come, someone will come, will come.
My *patmal* brother will come.
He will bring a dress for my brother, another for my sister,
And bangles for my sister-in-law.

SILONO

Silono falls on the full-moon day of the month of Bhādon (August-September), eleven days after Tīj. It coincides with Rākhī Bandhan ("Charm Tying") and has merged with it, as McKim Marriott has noted in his village of Kishan Garhi:

> This all-Indian festival ("Charm Tying") coincides and blends in Kishan Garhi with the festival known regionally as *Salūno*, a festival which marks the end of that annual fortnight during which most young wives return for a visit with their parents and siblings. On *Salūno* day, many husbands arrive at their wives' villages, ready to carry them off again to their villages of marriage. But before going off with their husbands, the wives as well as their unmarried village sisters express their concern for and devotion to their brothers by placing young shoots of barley, the locally sacred grain, on the heads and ears of their brothers. Since brothers should accept nothing from their sisters as a free gift, they reciprocate with small coins. . . . Parallels between the familial festival of *Salūno* and the specialized Brahmanical festival of Charm Tying—between the role of the sister and the role of the priest—are obvious.[22]

The "charm-tying" procedures at Rāmpur are as follows: A Brāhman ties a *ponchi*, or wristband of colored thread, around the wrist of the head of the family. In return he is given a handful of grain, or sometimes as much as a *sīr* of grain. Girls also tie *ponchis*, more elaborate ones, around the wrists of their brothers or cousins and their brothers' or cousins' wives and sons, receiving from a few annas to five rupees in exchange. (When unmarried girls receive money, they give it to their mothers.) A girl receives a scarf or a shirt from her sisters-in-law. Some families give her a calf.

Two different explanations of the festival's origin trace it back to Paras Rām, a Brāhman who is said to have lived some hundred thousand years ago. According to the Brāhmans of the village, Paras Rām, after fighting twenty-one battles against the Rakshasas, called in the rulers

[22] Marriott, *op. cit.*, 198.

who had asked him for help in this campaign, and tied *ponchis* to their wrists to symbolize *dharma*, or duty. According to the local Jāṭs, Paras Rām tied *ponchis* around the wrists of subjects who did not pay their taxes and made them pay. There are also different explanations for the girls' custom of tying bands on their brothers' wrists. One traces it back to Abhimanyu, a warrior in the Mahābhārata who was given a *ponchi* by his grandmother; he was invulnerable while wearing it, but was overpowered when it broke in battle. Another explanation for the custom is that Brāhmans and girls are held equally sacred. Brāhman girls used to give *ponchis* to their fathers on Silono, and the custom later spread to other castes.

According to Mukerji, Brāhmans take advantage of this festival occasion to exploit the public.[23] But the Brāhmans of Rāmpur are not guilty of this offense. In fact, they have not tied *ponchis* for the villagers for the past thirty years, since they consider the gifts of grain a degrading form of charity. But there is a Brāhman from another village who performs this function at Rāmpur and receives the grain-offerings. Despite their abstention from this custom, the Brāhmans still celebrate Silono more than do the members of other castes. The Jāṭs consider it a minor festival, but they prepare special foods, such as rice pudding and pancakes on this day and sometimes give some food to the Bhaṇgīs who work for them. A fair is held on Silono at Bahādurgarh, about three miles from Rāmpur, and about forty or fifty men from Rāmpur go there every year to attend the wrestling matches and the markets.[24]

JANAM AṢṬAMĪ

The anniversary of Lord Kṛṣṇa's birth falls on the eighth lunar day in the dark fortnight of the month of Bhādon. The festival of Janam Aṣṭamī (eighth day of birth) is observed by Hindus all over India. The story told in Rāmpur about its origin agrees in general with the legend of the Great Tradition, to use Redfield's phrase. The demon King Kansa determined to kill all the children born by his sister Devakī, because his Brāhman advisers had told him that he would be killed by one of them. Kansa imprisoned his sister and brother-in-law and killed each child as it was born; but just before the birth of Kṛṣṇa, the eighth child, Devakī persuaded her sister to exchange babies. Kṛṣṇa was smuggled out to safety and lived to kill King Kansa.

Fasting is observed on this day throughout India, commemorating the fast of those who were anxious for Lord Kṛṣṇa's safety. In Rāmpur at least two or three people in each family fast on Janam Aṣṭamī, especially women and girls over thirteen. School boys are apt to fast too, because they are told about Janam Aṣṭamī in school. During the day no food or water is consumed by those observing the fast. No pipes are smoked. Around four o'clock people take some sweetened water, but food is eaten only on the appearance of the moon. Those who are fasting face the moon and pour some water out of a pot onto the floor. Then everyone is given some *charnāmrit*, made of milk, sugar, and *tulsī* leaves, and the meal begins. The special dish

[23] His amusing description is worth quoting: "Raksha Bandhan, popularly called 'Salono,' is the full moon of Sravana, and this occurs exactly ten days after Nag Pachami. 'Salono' is a corruption of the Persian term *Sal-i-nau*, 'the new year'; and it is a name given to the full moon of Sravana, because it marks the point of transition between the old and the new Fasli, or agricultural year. . . . It is treated as a great harvest-day by Brāhmans of the priestly order, and the mendicant class, who wander about the town all day from sunrise to sunset, carrying a bundle of 'Rakshas,' visiting the houses of the well-to-do, tying a 'Raksha' round the wrist, whenever they can, hanging on until they have received a cash present, and then departing to repeat the same performance, in as many more places as they can go to. If they happen to meet any of their clientele on the road, they waylay him there, and insist on tying a 'Raksha' round his wrist, however unwilling he may be to be manacled in this manner in the public streets. The merest chance of an acquaintance, the most casual contact, the remotest connection is enough to establish a bond of relationship between you and a Brāhman of this class; entitling him to the privilege of tying a 'Raksha' round your arm, wherever he may happen to catch you on this day. Discharged cooks, whether of your own house or that of a friend at whose place you have once dined; post and telegraph peons, who happen to be Brāhmans by caste; Brāhman constables attached to the Police Station under whose jurisdiction you live now or ever lived in the past; nephews of a former Chaukidar or Chaprasi of your office; not to speak of *all* Brāhman members of your present domestic and office establishment—all these have a strong claim upon your wrist and your purse." (*Op. cit.*, 91–94.)

[24] Wiser gives a brief account of this festival: "On this date, the bard places the coloured cotton bracelet on the wrists of his jajmans, for which he receives eleven ounces of grain and from two to four pice. The florist supplies henna for staining the feet of the ladies of the Brahman's family and receives 11 ounces of grain. All of the employees receive a handful of *Simai*, cooked with raw sugar, one or two *puris* and 1 or 2 *Dal ki kachoris*." (Wiser, *op. cit.*, 87, 1936.) Here the Bhat, or bard, ties the bracelet, rather than the Brāhman.

is usually *chorma*, made of baked *chappāttīs* torn into bits and pounded with sugar and *ghī*. Rice pudding and pancakes are made by those who can afford them; those who cannot eat *lapsī*, made of sugar and flour. No food is given away, since it is a fasting day. During the evening the people sit on the housetops, tell stories about Lord Kṛṣṇa and sing songs. At the end of each song the women repeat "Victory to Lord Kṛṣṇa!"

GŪGA NAUMĪ

On the ninth Badi of the month of Bhādon (August-September) there is a festival in honor of Gūga *pīr*, who, according to Crooke, is also known as Zāhir Pīr, "the saint apparent," or Zāhir Dīwān, "the minister apparent," or, in the Punjab, as Bāgarwāla.[25] According to Rose, his cult is widespread in the Punjab.

> His worship extends throughout the province, except perhaps on the frontier itself. It is probably weakest in the Western Plains; but all over the eastern districts his shrines, of a peculiar shape and name, may be seen in almost every large village, and he is universally worshipped throughout the submontane tract and the Kangra Hills. . . . He flourished about the middle of the 12th century. He is really a Hindu, and his proper name is Gūga Bīr or Gūga, the Hero. . . . But Musulmāns also flock to his shrine, and his name has been altered to Gūga Pīr or Saint Gūga, while he himself has become a Muhammadan in the opinion of the people.[26]

His grave is in Bikāner, near Dadrewa. Crooke says that it is in his function as a Snake King that Gūga is specially worshipped.

> When he is duly propitiated he can save from snake bite and cause those who neglect him to be bitten. His shrine is often found in association with that of Nara Sinha, the man-lion incarnation of Vishnu, and of Goraknath, the famous ascetic, whose disciple he is said to have been. He is adored by Hindus and Muhammadans alike and by all castes, by Rajputs and Jats, as well as by Chamars and Chuhras. Even the Brahman looks on him with respect. "Which is the greater," says the proverb, "Rāma or Gūga?" and the reply is, "Be who may the greater, shall I get myself bitten by a snake?"—in other words, "Though Rāma may be the greater, between ourselves, I dare not say so for fear of offending Gūga." He is represented on horseback, with his mother trying to detain him as he descends to the infernal regions. He holds as a mark of dignity a long staff in his hands, and over him two snakes meet, one being coiled round his staff. Both the Hindu and Muhammadan Faquirs take the offerings devoted to him, and carry his chhari or standard, covered with peacocks' feathers, from house to house in the month of August. . . . According to the last census Gūga had 25,000 worshippers in the Panjab and 123,000 in the North-Western Provinces.

Legends about Gūga may be found in the works of Rose[27] and of Temple.[28] The following story, which accounts for the festival's origin, is the one popularly told in Rāmpur: There were two sisters, Bachal and Kachal, who served a holy man. Bachal was devoted, but Kachal was lax in her attentions to the *pīr*. One day the *pīr* opened his eyes from a trance, and on seeing Kachal in attendance, blessed her with a gift of two sons. Later, when Bachal came and asked the holy man for a favor, he said that he had already bestowed one. Bachal then complained that her sister had served him very little, whereupon the *pīr* said that Bachal would give birth to a son who would kill Kachal's two sons. This son became known as Gūga, a brave fighter, who eventually fulfilled the prophecy. When his mother refused to look at him after the murder, Gūga had himself buried alive with his horse. Many years later a prisoner had a dream in which Gūga appeared, asking him to build a shrine above the place where he had buried himself. The prisoner escaped from jail and managed to reach the spot but was recaptured and returned to his cell before he could carry out the commission. Once more, however, the prisoner made his escape and this time succeeded in building a monument above the grave, dedicated to Gūga *pīr*. It is said that Gūga appeared to other living persons as well, principally his wife, whom he used to visit every night after his death. But he stopped these visits when his mother hid herself in the room to get a glimpse of him. Some people say that his grave still shakes every night at midnight, when Gūga leaves it.

Somehow, the cult of this hero has become mixed with snake-worship. The snake is said to be Gūga's brother, and the two are worshipped together during the festival, which comes at a time when snakes are rather abundant in Rāmpur, frequently turning up in peoples' homes. It is said that those who do not offer worship on

[25] Crooke, W., *The popular religion and folklore of northern India* 1: 211, London, Constable, 1896.

[26] Rose, *op. cit.*, 171.

[27] *Ibid.*, 172–192.

[28] Temple, Sir Richard C., *The legends of the Panjāb*, 3 v., Bombay, Education Society's Press, 1884–1900.

this day will be visted by snakes—which may perhaps help to keep the cult alive.

On Gūga Naumī the women of the household take the black soot from their iron griddles and draw figures on the wall representing a snake and a man on horseback. An earthen lamp is lit and placed before the drawing, together with some pancakes and a little of everything else cooked that day. Some oil and *ghī* are poured over a hot ember to make it flare up and burn. Everyone says, "Gūga has appeared." Then the worshippers fold hands and pray, "O Gūga *pīr*, please don't appear to us during the coming year."

There used to be a Muslim fakir in Rāmpur who received the food offered to Gūga, but now that he is gone, the food is given to dogs or cattle. The fakir also used to receive offerings of brown sugar in Gūga's name. This sugar was given by a family if a buffalo stopped giving milk, for Gūga was believed to have power over buffalo milk, and brown sugar might therefore be vowed to him to restore the flow. Nowadays this offering is given to neighbors.

There used to be four *bhāgats* or devotees of Gūga *pīr* in Rāmpur—three Jāṭs and one Camār. To become such a *bhāgat* it was necessary to go on foot to the grave of Gūga *pīr* in Bikāner. The pilgrim had to wear yellow robes and hang a wreath of yellow thread about his neck. Camārs beating drums and carrying banners accompanied the devotee. At the monument a goat or a she-calf was sacrificed to the *pīr*. On his return home the pilgrim gave a feast to all members of his caste.

It was the custom for each of the *bhāgats* of Gūga *pīr* to burn a *ghī* lamp on a different day during the month of Bhādon, so that the *pīr* would receive four days of worship. On these occasions the *bhāgat* sat before his *ghī* lamp while a group of Bhaṅgīs and Camārs beat small drums called *dorus* and sang songs about Gūga. The *bhāgat* was then held to be possessed by Gūga's spirit. After shivering and shaking, which indicated Gūga's advent, the devotee would get up, jump about, and beat himself with an iron rod. People then asked questions about future marriages, births, or the coming of rains. The *bhāgat's* self-administered blows were supposed to cause no bruises, although he kept it up throughout the night. People who attended these sessions and received answers from the spirit gave small amounts of grain (¼ to ½ *sīrs*) to the drummers.

In the old days a Camār *bhāgat* announced a session of this kind by parading about the village with a band of drummers and attendants carrying banners. Such a banner would have an emblem representing a horse and a man, and would be topped by a few peacock feathers. All the households in the village contributed grain to these entourages. On the day of Gūga Naumī all the Camārs of the village and some from the adjoining four villages ate together at the home of the *bhāgat*, who paid all the expenses of the feast beyond what was collected from the villagers.

These customs are no longer followed in Rāmpur. The last *bhāgat*, a Camār, died fifteen years ago. During his lifetime this Camār became influenced by Ārya Samāj doctrines, and for a while refrained from giving mediumistic sessions. But when his house became filled with snakes, he vowed to resume the performances again and to hold them every year until his death. After that time there were no more *bhāgats* in the village, and no one in Rāmpur has made a pilgrimage to the Gūga *pīr* monument for the past twenty-five years. Yet almost all the families in the village still worship Gūga *pīr* and the snakes. There are only two or three Āryā Samājist families in the village which do not. Gūga Naumī is therefore still observed.

KANĀGAT

Kanāgat or *Srāddha* is the yearly ritual occasion for honoring the family dead through gifts of food to Brāhmans. In this part of India these observances take place during the sixteen-day period between the full moon day of Bhādon and Amāvas (no moon day) in the month of Asauj (September-October). A dead person is held in remembrance by his family (represented by the eldest son or grandson) on a particular day of this half-month, according to the day of the fortnight on which he died. Thus, if a man died on the third day of a month—any month—food is given in his name on the third day of Asauj. The dead family members who are honored at Kanāgat may include the father, mother, grandfather, grandmother, and sons over eighteen. Sons below that age are not included. Daughters are considered members of another family through marriage. A girl cannot perform a *srāddha* in memory of her father and mother; only sons can do that. *Srāddhas* may also be celebrated for an uncle and aunt who died

son-less and whose property has been inherited by the person concerned.

On the day before a *srāddha* a Brāhman is asked to come and perform the ceremony. He arrives early the next morning and takes a bath at the family home; then he is given the raw materials for his meal—rice, milk, flour, and *ghī*, which he prepares into rice-milk pudding and *chappāttīs*. Meanwhile, the eldest son or grandson of the family goes to bathe in the village pond. He must not wring out the wet *dhotī* which he is wearing. As he holds one hand over the other, the Brāhman puts a few leaves of *dab* grass into his hand and pours water over it. Then he reads aloud some *mantras*.

The son or grandson of the household then gets up and pours water from a pot onto the floor. As he does so, he faces the sun, which is said to be carrying the water, through its rays, up to the family ancestors. Then the Brāhman takes two *chappāttīs* and a little pudding and gives the former to a cow, the latter to the crows flying about the house. (The cow is held to be sacred; the crows, which are common in the village, are believed to be descendants of a Hindu sage.) This done, the Brāhman eats. The dead man who is being honored on this day receives the benefit of this food in the process and will be helped on the road to salvation. It is said that this custom was started by a good king called Karan, who always gave gold in charity. When Karan died and went to heaven, he in turn was given only gold, since that is what he had given away in his lifetime. He couldn't get anything to eat. Karan arranged to return to life for sixteen days, during which time he gave away as much food in charity as he was able. Thus the sixteen-day period of Kanāgats was initiated.

The Brāhman who eats the food may take some of it home to his wife. He also accepts some *dakshinā*, or ritual remuneration, the amount of which varies in different families. Some give ½ to 1 *sīr* of grain; Kumhārs or Camārs may give from two to eight annas. If a Brāhman cannot come when summoned, he may delegate his powers to his wife or to another Brāhman. In the latter case, the first Brāhman is the one who gets the fees; he may turn over about a quarter of the amount to his substitute.[29]

A well-to-do man sometimes gives a big *srāddha* called *battis*, to which thirty-two Brāhmans are invited, as well as other guests, all of whom must be members of the host's caste. A feast of this kind costs between fifty and one hundred rupees and is given only once or twice in a man's lifetime.

On the day of a *srāddha* one should not use the grindstone or make butter. But these taboos are giving way and are often violated at present. Brāhmans still follow the old customs, but the Jāṭs and the lower castes are lax in their observance and have modified the ceremony in some ways. The main difference, which affects the whole performance, is that the services of a Brāhman are sometimes dispensed with. Special foods are still cooked and given to the cow and the crows, and the son of the household faces the sun and throws water from the pot as usual. But the *mantras* are not recited, for nobody knows them. Ten of the fifteen Brāhman families in the village attend *srāddha* ceremonies only in other Brāhman households and not in those of other castes.

NIORTHĀ–DASAHRĀ

Niorthā, which is the same as Marriott's Naurthā[30] (from Nava Rātra, or "nine nights") is a nine-day period following the moonless Amāvas day in Asauj (September-October). Dasahrā means "tenth." The celebrations at this time are carried out by the women and children and take place after dark. They do not interfere with the intensive agricultural work in progress during the day—the harvesting of millet and maize. Sugar cane is now ready to be cut, and the sowing of gram has begun. All the men are busy in the fields.

There is no worship of tools or weapons at Dasahrā, as in some other parts of India such as Rājputāna and Mahārāṣṭra. Nor do the local celebrations include such patterns as the burning of effigies of Rāvana or the performance of Rām Līlā plays which tell the story of the Ramāyana. Some members of the village go to Delhi to see these celebrations. The story about Rāvana does not seem to be well known in Rāmpur, although those who have been to school are familiar with it. A Rām Līlā was performed in Rāmpur about twelve years ago, but none has been given since.

The principal object of worship during the nine days in Rāmpur is a local deity named Sānjhī, who was once the wife of a Camār. It is said

[29] Wiser says that "In the case of the poor, Brahmans are fed only on the fifteenth day, which is *Amawas*." (*Op. cit.*, 88.)

[30] Marriott, *op. cit.*, 192, 200, 202, 215.

that the Camār came to the village to weave cloth, but the villagers hesitated to give him thread, because other weavers had run away with their yarn. The Camār, however, promised not to leave without letting them know beforehand. After he had collected a lot of yarn from the villagers, the Camār sent Sānjhī and their son to another village. The next day the weaver wound the yarn about his waist and went around telling the people that Sānjhī and his son had gone and that he was leaving soon with the yarn. The villagers were working in the fields at the time, and when they heard the Camār's words they simply thought he was joking. Nobody took him seriously. But the man left the village just as he said he would, and nobody ever saw him or the yarn again. A year later some boys tending cattle came upon Sānjhī. They took some sticks and beat her until she died; then they threw her into a pond. This is the story behind the festival, but no one in the village could explain how or why Sānjhī came to be worshipped.

On Amāvas day the women of seven or eight neighboring families belonging to the same caste join to make a representation of Sānjhī. A portion of the outer wall of one of the houses is plastered with mud and cow-dung. On this are affixed some star-shaped pieces of earthenware, to form the figure of a woman. Ornaments and bangles of limestone are placed on the image. Every evening for nine days the girls and young women of the families gather around the Sānjhī. The women hang a lighted earthen lamp on the wall, place some food at Sānjhī's mouth, and sit around singing songs for two or three hours. When the singing is over, one of the families distributes *bakli*, a sweet made of boiled grains of wheat mixed with brown sugar.

On the eighth evening of Niorthā the figure of a man carrying a little bag is made beside Sānjhī. He represents her brother bringing her some gifts. On Dasahrā, the tenth day, just before sunset, the figure of Sānjhī is removed from the wall and a coat of whitewash is applied to the spot where her image had been. The figure of a peacock or *aterna* is then drawn over it. Sānjhī's face is removed and her body is placed in a basket which is carried to the village pond by a few girls. There Sānjhī's body is broken up and thrown into the water. Later in the evening all the women go singing to the pond. Sānjhī's face is now placed, along with a lighted lamp, in the bottom of a broken earthenware pitcher, which is then set afloat on the pond. The boys of the village gather around and laughingly throw stones at the floating Sānjhīs, eventually drowning them all, to the shrieks and cries of the women.

After the drowning of their Sānjhīs, the different groups of women return to their homes, singing songs. They sing before the house of each family which participates in the Sānjhī group, and are given one-half to one *sīr* of grain at each home. The women then take the collected wheat to the Baniyā's shop and buy sugar cubes, brown sugar, or roasted rice, which are distributed among the contributing families. Sānjhī is honored by all the families in the village, although the Jāṭ women apparently resent the idea that Sānjhī was a Camār. The Ārya Samāj seems to have had no influence on this festival, primarily because it is celebrated only by the women, who have generally been resistant to Ārya Samāj teachings.

The tenth day, Dasahrā, marks the beginning of the sowing of barley. The barley seedlings planted by farmers in house-plots on Amāvas have sprouted by this time. On Dasahrā day a Brāhman presents the head of each household with a few barley seedlings called *Niorthās*, in return for which he is given one-half to one *sīr* of grain. A Brāhman may have to cover many villages, which makes it impossible to visit everyone at Dasahrā. He therefore brings *Niorthās* on any of the ten festival days. The Brāhman who does this at Rāmpur is from another village, since no local Brāhmans will perform this function any more.

Among the Brāhman families themselves the daughter or sister of a household gives *Niorthās* to her father or brother and receives from them one or two rupees in return. Unmarried girls are given only four to eight annas.

No one in the village harvests sugar cane before Dasahrā. On this day the first five sugar cane stalks are given to a Brāhman or to a cow.

On Dasahrā day women make ten dung cakes with barley seedlings placed in each. These are left to dry, to be burned on Devuṭhāni Giās in the following month. This is said to be a test, to see whether or not the dung cakes will spoil, as they would have done during the rainy season just passed.

KARVĀ CAUTH

Cauth means "fourth," referring to the day of the month, for this festival comes on the fourth

badi of Kātik (October-November).[31] A *karvā* is a small pitcher, which figures prominently in the festival. The festival is celebrated by married women of the Brāhman, Baniyā, and Kumhār castes to honor their husbands. During this time most of the men are busy in the fields sowing wheat, barley, and peas; they play no part in the festival, beyond being the objects of veneration.

On the day before Karvā Cauth the women referred to above observe a fast. The next morning they bathe and then fill a water pitcher around which they tie a yellow thread. The pitcher is kept near the hearth until needed. At about four o'clock in the afternoon the women of the neighborhood gather about an elderly Brāhman woman to hear her tell the story of Karvā Cauth, which runs as follows:

A king had seven sons and one daughter. All the boys loved their sister very much. When she fasted on Karvā Cauth everyone else in the family fasted too. In the evening one of her brothers set up a tent, another cooked food, and another brought water. One of the brothers asked her to eat. As the princess ate her first morsel of food, she found a hair in it, in the second a fly, and at the third she learned of her husband's death. The princess left her food at once and started to travel toward her husband's home, bowing to every woman whom she passed. On the way she met Pārvatī, Lord Siva's wife, and bowed to her too. Pārvatī blessed her with happiness and the recovery of her dead husband. She told the princess to take some blood from her little finger and to put it on the corpse. The princess did so, and her husband came back to life.

After they have heard this story, the women of the village pour water to the sun from their pitchers. Each gives one-fourth to one-half a *sīr* of wheat to the story-teller; on the following day they present their pitchers to her too. There are some variations in this celebration. The Kumhārs offer the water to the moon, rather than to the sun; and they do not break their fast until that time. The Brāhman women break their fast at sunset. The women of Jāṭ, Camār, and other castes do not observe the festival at all. The reason given by Brāhmans is that Jāṭ women remarry on the death of a husband, while Brāhman women do not.

A Brāhman, Baniyā, or Kumhār bride, who is staying at her parents' home at the time of Karvā Cauth, keeps a fast and worships some *patāsas* (sugar cakes), which she sends to her husband. He eats some of them and distributes the others to children.

This festival seems to have a fairly broad local distribution, having been described by Crooke for Hardoi, by Wiser for Mainpuri, and by McKim Marriott for Kishan Garhi. Marriott gives some alternative (but basically similar) versions of the legend and describes some aspects of the festival which are not paralleled in our data from Rāmpur:

> Wives of all castes but the Jāṭ caste fast by abstaining from bread during the day. While they are fasting, each wife completes a mural picture showing two "moons" and depicting the events of the Pitcher Fourth story. The story is told before each picture by one of several elderly ladies, mostly Brāhmans, who make a specialty of story-telling. . . . The fast continues until the real moon rises in the evening. Then each wife goes to where she can see the moon, sketches a sacred crossroads at her feet, and pours water onto the crossroads out of a spouted earthenware pitcher as an offering to the moon. She next worships the moons of her mural picture by pressing food against their "mouths"—a few wives also make mud figurines of a goddess at this point—and then breaks her fast after serving food to the men of the family.[32]

HOI

Hoi comes three days after Karvā Cauth, on the seventh *badi* of Kātik. As in Karvā Cauth, the festival is celebrated by women who fast and come together to hear an edifying story told. The men are still busy working in the fields, sowing wheat, barley, and peas, while the seed stocks of millet are being removed. Karvā Cauth was in honor of husbands; Hoi is in honor of children. Only the women who have children fast on this day; others do not.

In the morning the women bathe and fill two small pitchers with water. Some fill one with grain. As in Karvā Cauth, the pitchers are kept near the hearth. The fast is broken at about four o'clock in the afternoon, when the women of an extended family gather together. Then one of the women, usually a member of the family, tells the following story:

[31] McKim Marriott notes in a personal communication, "That's what the name seems to imply, but in Kishan Garhi and in Wiser's village, the festival actually occurs on the third day." In Ram Ratan's report on the Bhaṇgīs of Delhi, the fourth day is given (*op. cit.*).

[32] Marriott, *op. cit.*, 204.

Once upon a time there was a king who had seven married sons and one daughter. One day the princess and her seven sisters-in-law had to go and dig some mud from a pond. The sisters-in-law all made excuses; they had to go and ease themselves. So the princess was left alone. She began to dig and filled up all the others' buckets. But in the process she unwittingly killed Hoi's children, who lived in the earth. Then Hoi came. In revenge he took away her womb.

When the seven sisters-in-law came back, the princess told them of how Hoi had stolen her womb. They were sorry to think that she could not bear children now. One of them, the eldest, asked Hoi to take her own womb in exchange for the princess's. So Hoi returned the princess's womb and took the other instead. Then the eight girls came home.

The eldest girl told her mother-in-law that she had given her womb to Hoi. The mother-in-law was furious and turned her out of the house, saying that she was of no use any more.

In her wanderings, the outcast girl came upon a cow all covered with insects. She took care of the cow and looked after it for twelve years. Then she gave birth to a child. When she distributed pancakes to relatives, announcing the birth, the news reached the ears of her mother-in-law. The mother-in-law asked the *Nāīn* (barber's wife), who had brought the pancakes, to take her to see the baby. So she found her daughter-in-law with her little son. When the old woman asked how this had happened, the daughter-in-law told about how she had looked after the cow for twelve years.

While telling this story, the narrator puts a few grains in a tumbler of water at the end of every sentence. Then, when the story is finished, she throws the contents towards the sun. Then all the women go home and eat the food they have prepared. Sometimes the story-teller is given a few handfuls of grain by each of the women present. The water in the small pitchers filled that day is kept for later use at the Gobardhan festival. If the grains are kept, they are given to children who go and buy sweets from the Baniyā. The Hoi story is not told to males or to unmarried girls.

The purpose of the fast, it is said, is to protect children. Only some of the families prepare special foods at Hoi—*hālvā* or rice cooked with brown sugar. The Kumhārs (potters) get a little profit from the small pitchers used on this day. They receive one-fourth *sīr* of millet or maize for each pitcher.

All the women in Rāmpur observe these customs; they are not likely to die out soon. It is said that formerly Brāhman women were called in to tell the Hoi story in different families, but nowadays one of the older women of the family tells the story instead, and Brāhman women are no longer summoned.

Hoi seems to have a very limited regional distribution. It is not mentioned by either Wiser or Marriott in their lists of festivals. However, an account of Hoi appears in Ram Ratan's study of the Bhaṅgīs of Delhi:

> On this festival women first plaster some space on some wall of the home in the evening with a mixture of cow-dung and water and clay and on it draw a woman-like figurine. Then one nail is fixed in the wall near the figurine, and it is by this nail that a silver necklace consisting of as many silver beads as the number of sons in the house, is hung. The necklace also has a flat piece of silver, with engraved figures of a cow with its calf. The following articles are put before the figurine: Four pots full of water, an earthen lamp full of ghee which is lit on that very spot, some cooked rice, "Sivian" (a kind of dish) and some "patasha" (a kind of sweet). The women sit before the "Hoi" figurine and an old woman tells a story to them. This story is never told to any male—adult or child for, in the opinion of the women, it brings bad luck to the males."[33]

GIRDI–DIVĀLĪ–GOBARDHAN

Divālī, the festival of lights, which is popular all over India, is one of the four main festivals of the village. It falls on Amāvas day in Kātik. Girdī comes the day before, Gobardhan comes on the following day. By this time there is less activity in the fields. Ploughing is nearly over, although the sowing of wheat and barley is in progress. The weather is cooler, and people are beginning to wear warmer clothing.

On Amāvas day the cattle are not yoked, but are decorated with a reddish paste made of red oxide and oil. Spots are daubed on the animal's sides and face; their horns are painted red, green, or blue, and peacock-feathers may be attached to their heads, while their necks are hung about with bead necklaces and leather bands clinking with little bells. There is much competition in decorating the cattle. While the Jāṭs are bedaubing their cows and oxen, the Kumhārs do the same with the asses used for

[33] *Op. cit.*, 261.

carrying clay. Domestic animals may be given brown sugar to eat on this day.

The houses are refurbished too. Few people go to work in the fields now, for every family is busy with housecleaning. A new coat of plaster or whitewash may be applied to the walls, while oil is administered to door hinges and wagon axles. Everything in the house is cleaned and polished. Some people draw flower-shaped figures on their doors. Most of the women prepare special foods—*hālvā*, rice pudding, *pūrīs*, etc.

The Brāhmans who celebrate Girdī light five small lamps and one big lamp on that day, but most of the other castes do not do so, preferring to combine Girdī and Divālī in one celebration. It is on the day of Divālī, then, that the lamps are lit all over the village. Little earthen lamps line the tops of the houses, while others are placed on carts, yokes, and implements used by the household. More lamps appear in cattle-sheds. Children from every family in the village go to place lamps at the shrines for Bhuiyān, Gurgāon-wālī Mātā, Kainthī-wālī Mātā, and other village godlings and local *pīrs*. Children enjoy Divālī. They get toys and candies and they enjoy going about looking at other peoples' houses in the evening, with all the lights and excitement about. By nine o'clock, however, everyone in the family is at home for the worship of Lakṣmī, goddess of wealth. The head of the family puts money and ornaments in a big metal dish and places it near an oil lamp, applies turmeric marks to them, and repeats some Sanskrit *mantras*, if he knows them, or else says, "Goddess Lakṣmī, come to me once again during the coming year." Among the Kumhārs a silver rupee is placed near the lamp, with a turmeric mark on it. Sometimes the head of the family prefers to worship Lakṣmī alone, in order to hide from other members of the family how much money he has.

It is the custom to leave a light burning all night in the house, and to leave the doors open, so that Lakṣmī can come in to bless the household. (It is believed that Lakṣmī will not enter an untidy or poorly lit home.) But, since there is a possibility that thieves may enter as well, some people now lock the front door.

Sidha, consisting of rice, brown sugar, and *ghī*, is sent to daughters or sisters at this time. Shirts or veils may also be sent for their children. The expenses differ for different families, some preferring to send cash amounting to from two to five rupees. The Baniyā in the village sends sweets to his neighbors on Divālī and starts new account-books. Of the various castes, the Kumhārs seem to benefit the most. They make earthen lamps for every family in the village and receive four or five *sīrs* of grain from each. However, they are not satisfied with this amount and believe that they should receive eight *sīrs*.

Local "explanations" for the celebration of Divālī correspond with those given elsewhere in India and are related to the Hindu Great Tradition. One is the yearly coming of Lakṣmī; another refers to the kindling of lights by Raja Bali, and a third attributes it to the return of Rāma from the conquest of Lānka (Ceylon). The Ārya Samāj supports still another rationale for the festival; they say that on this day their leader Swami Dayānand achieved enlightenment. But this interpretation was not offered by even the most staunch Ārya Samājist families in the village.

The Gobardhan festival comes on the day after Amāvas. On this morning the pitchers set aside at Hoi are brought out, and the water from them is used to clean a place in the family courtyard. Here a mound of cow dung is accumulated and shaped into the crude figure of a man. A cot is placed over it to protect it during the day. At about sunset the head of the family takes a metal plate on which he places a rupee or a silver ornament, a few roasted rice grains, and some turmeric. He lights a lamp placed on the middle of the cow-dung man and pours some buttermilk into the creature's mouth. Then the family head walks around the figure seven times followed by the male members of the family. He pours some water and places some roasted rice on each of the four corners of the figure. After the last round, he sets the plate down near the legs of the cow-dung man and puts a turmeric mark on it. Then roasted rice grains are distributed among all the family members.

A Brāhman usually announces the proper time to make cow dung into dung cakes. Nine to eleven cakes are usually made on this day; it must be an odd number (except for thirteen, which is unlucky), for even numbers suggest an end, while odd numbers indicate progress. Then the dung cakes are placed for storage in a tent-shaped structure known as *biṭaurā*. Formerly, dung cakes were not made between Jaith-kā Dasahrā (May-June) and Asauj (September-October). But after Partition dung cakes sold at high prices in Delhi, and people began to make them throughout the year.

The Great Tradition "explanation" for this festival is known only to one or two Brāhmans in Rāmpur. This is the story about the locking-up of cattle by Indra and their release by Lord Kṛṣṇa. Indra, in revenge, poured rain in torrents, but Kṛṣṇa protected the world by holding up a mountain over it. Later the cattle dung was collected and the Gobardhan festival initiated. The reason given by the villagers for celebrating this festival is simply that *gobar* (dung) is wealth (*dhan*), for it is used for fuel, manure, and other purposes.

McKim Marriott, who describes this festival as given at Kishan Garhi, translates Gobardhan as "Cow-Nourisher" (Go vardhana), later transformed by village etymology to *Gobar dhan*. In his account of the Kṛṣṇa legend he refers to a hill named Gobardhan, about forty miles from Kishan Garhi, as being the hill which Kṛṣṇa is said to have lifted up as an umbrella to protect the people and their cows. Marriott's description of this festival is worth quoting:

> The sacred hill of the *Purana* has become in each household yard a literal pile of cowdung, shaped into a rough homunculus with four embracing walls appended to its neck, and decorated on top with "trees" of straw and cotton. Within these walls are crowded rude loaves representing all of the cows, bullocks and buffaloes that the family owns or would like to own. To secure any possible benefit to the family's milk and fodder supply, feeding troughs, milking vessels, churns, etc., are also represented in fecal model. The family cowboy is there, too, modelled in dung—the real family cowboy gets a rupee on this day—and so is a model tank to which the cowboy can take the animals for water. The women and children of each family finish this dung construction by day; in the evening all of the agnates of each family worship it jointly by placing a lamp on its navel, winding a thread around its trees, and shouting in solemn procession, "Long live Grandfather Cowdung Wealth!" Members of the Weaver caste of Kishan Garhi add their bit, too, for on the next morning they must be paid to sing a Cowdung Wealth awakening song before the dung image can be broken up for use as daily fuel. But a portion of the cowdung remaining from the celebration must be set aside; this portion is re-shaped and scored into the form of an enormous cracker; the cracker is dried and preserved as sacred until it can be contributed to the great annual all-village bonfire at the *Holī* festival six months later.[34]

Mukerji says that Gobardhan is a purely cattle feast, observed almost exclusively by the Ahir caste,[35] but this does not agree with our data or with Marriott's. He also states that Gobardhan has died out except in remote villages: "Except in such parts of the United Provinces as are not yet traversed by a railway line, this old festival may be said to have become altogether defunct."[36] However, it is still observed in some of the villages which have been studied in the area—in Rāmpur, Kishan Garhi, and Wiser's village of Karimpur, and—so far from being limited to marginal areas remote from the railway lines—it is celebrated by the Bhaṅgīs of Delhi.[37]

DEVUṬHĀNI GIĀS

Devuṭhāni is derived from *dev*—god, and *uṭhana*—to wake, and refers to the awakening of the gods who have been asleep between Bhadalia Naumī in Sādh (June-July) and Devuṭhāni Giās, which falls on the 11th Sudi of Kātik (*Giās* means eleventh). Marriages cannot take place while the gods are asleep, for they are invoked at weddings. The marriage season begins, therefore, after Devuṭhāni Giās. This is a woman's festival in which men play no part. Boys are warned to stay away and are told that they will get eczema if they come near the women. The men are apt to be working in the fields as usual, although the sowing of wheat and barley is nearly over, and the *Sāvan* crop has been harvested. Winter is on the way.

The women fast on this day. They prepare *chorma* (made of sugar, bread, and *ghī*), *semian* (sweet burned noodles) and other delicacies; but they eat nothing until evening. In the afternoon a group of small girls who generally belong to the same extended family go around to the component family households, singing songs. They are given one-half to one *sīr* of grain by each family, which they sell to buy roasted rice grains for distribution among themselves. In the evening all the women of one or two neighboring extended families get together, bringing with them the *chorma* they have made. They set up a pile of ten dung cakes which were prepared at the last Dasahrā festival. Then the oldest lady present sets fire to the heap. The women sit around the fire, eat their *chorma*, and sing songs about the awakening of the gods. Unmarried girls sing a refrain, "*Harnarāin terī pūchrī, Desodah terā biah*," ("O *Harnārain*, your tail

[34] Marriott, *op. cit.*, 200. See also the similar account in Briggs, *op. cit.*, 119, and Crooke, *op. cit.*, **2**: 296.

[35] Mukerji, *op. cit.*, 175.

[36] *Ibid.*, 174.

[37] Ratan, *op. cit.*, 263.

[end], *Desodah* [God grant] your marriage") while burning the tips of the strings of their skirts. One informant interpreted this song to express relief that the period of waiting for marriage was over. The singing continues until the fire burns out. Then the women go home, eat what they have prepared, and set aside some of the food for the gods. This food was formerly given to a Brāhman, but is now presented to a daughter or sister of a neighboring family.

On Devuṭhāni Giās the women draw foot-shaped figures on the walls of their homes, made with red earth and water. One explanation for these figures (which always out-number the members of the family) is that they are a magical device for making the family grow. Another interpretation was that they represent the gods who have awakened and are walking about.

Ram Ratan describes the festival as observed by the Bhaṇgīs of Delhi:

> In the morning, the women plaster with clay and cowdung some space on the wall and on the ground, in a corner of their house, where they draw a female figurine with long lines called "Harnarain ki Poochḍi," and as many footprints in number as there are persons, animals, and birds in the house. Sweetmeats, pudding, fried bread (puri), "Khir," and a lighted lamp are kept there, and are covered with a big vessel "parant." The women and girls keep fast. At about nine in the evening, women gather and beat the big vessels "parants," and sing songs for awakening the gods "devtās" who are supposed to be in sleep.

One of these songs is translated as follows:

> Gods go to sleep in the month of Mās.
> Gods get up in the month of Katak.
> I make them rise.
> My hand is put in a hanging basket.
> There are four breads in the hanging basket.
> Should I give them to the Brahmin or should I eat them?
> I give a cow with a broken horn to the Brahmin.
> The cow urinates in the house and makes water in front of the house.[38]

GANGA-JUMNA NAHAN

Fifteen days after Divālī, on the full moon day, it is customary to go and bathe in the Jumna River at Delhi or in the Ganges River at Garh, or Garhmukteshwar. The sowing isnow finished, and work in the fields has slowed down. So it is generally possible for about twenty or thirty families from Rāmpur to leave for Garh (about fifty miles away) in their bullock-carts. They leave five or six days before Nahan, with the members of one extended family sharing a cart. (A well-to-do family may take along a servant as well.) All of the carts travel together and halt together for lunch, evening meals, and sleep. Sexual joking is tabooed, for this is a pilgrimage to a sacred place. Hymns in praise of Rāma are sung along the way.

On reaching Garh the pilgrims fix up mat-tents on the river bank. It is believed that bathing washes away the sins incurred during harvesting —the beating of cattle, etc.; besides, it is part of one's *dharma*, religious duty, to bathe on this occasion. After an early-morning dip in the stream, the bathers give food to a Brāhman or to a *sāddhu* (holy man). The latter may also be given clothes by a woman who had formerly vowed to do so, if blessed with a child. Everyone goes to the big fair at Garh, which is attended by about a hundred thousand people. Clothes, ornaments, ploughs, etc., may be bought and religious discourses listened to.

On the same evening or the following morning, the people return home, taking with them some Ganges water and a few candyballs and roasted rice grains for distribution among the neighbors. Returning pilgrims also present food to a Brāhman who, in return, gives eight annas or a rupee to the daughter or sister of the household. It is only members of the agricultural castes who use bullock-carts for transport; others, like the Camārs, go by train.

Kātik (October-November) is considered to be a sacred month for taking baths. Childless women and unmarried girls of more than ten years of age take a bath every day throughout the month. On every Sunday during the month they light little earthenware lamps near the place where they bathe, and also leave a handful of grain for birds and animals. On the full-moon day those who can afford it go to the Ganges or the Jumna for a dip, while those who stay at home take a bath at the local well or pond and give something in charity to a Brāhman or a beggar. Elderly people and young girls keep a fast from the afternoon before Nahan until the rising of the moon. Those who go to the Ganges or the Jumna eat only after bathing in the river.

[38] Ratan, *op. cit.*, 267. See also a brief account of this festival in Crooke, *op. cit.* **2**. 300.

MAKAR SANKRANT

"The first few days of Pausa are unlucky," writes Mrs. Sinclair Stevenson, "but on Sankranti the sun ceases to travel towards the inauspicious south, where is the abode of death, and begins to move towards the north, and this changes everything." She goes on to add that Sankranti is followed by two months fortunate for marriages. It is the great day of the year for almsgiving.[39] We are told by Gupte that the festival, which marks the transit of the sun at the Tropic of Capricorn, is the beginning of the day of the gods and the night of the demons.[40] Makar Sankrant may fall either in the month of Poh (Pausa; December-January) or Māgh (January-February). It comes at a time when there is little work being done in the village, beyond the preparation of brown sugar. Although the weather is cold, everyone must take a bath and wash one's hair to avoid getting "heat in the brain." A less arduous custom at Sankrant is the eating of rice pudding, pancakes, *hālvā*, *ghī*, and brown sugar. Charity is no longer given to the Brāhmans at Rāmpur, except by a few families in the village; but the cattle are still fed, every family putting a little fodder near the village pond where the cows gather. There are protests about this custom, however, and the amount of grain given has been diminishing. *Sidha* (made of rice, brown sugar, and *ghī*) is given to the daughters and sisters of a family, together with some bangles and clothes for the children.

It is also customary to patch up quarrels at Makar Sankrant, particularly those between a married girl and her in-laws. The girl, accompanied by other women of the household, goes singing to meet her parents-in-law, who have gone out to the fields early in the morning, to wait at an appointed place. They enact a hypothetical quarrel in which the in-laws have supposedly left the house; the bride begs pardon and brings them back home with gifts. She may give a shawl or a blanket to her father-in-law and a veil or a shirt to her mother-in-law—clothes which she originally brought from her own home. The girl may also put some sugar into her mother-in-law's mouth—no doubt to sweeten it. The parents-in-law give nothing in return except their blessings. Gifts may also be given to the husband's older brothers and their wives, who reciprocate with a small present. These customs, however, are maintained for only the first two or three years after marriage.

BASANT PAÑCAMĪ

Basant Pañcamī, which means "Yellow Fifth Day," falls on the fifth Sudi of the month of Māgh, at a time when the fields are full of mustard-seed and yellow flowers. It is a pleasant spring-like time of year, when there is little work to be done in the fields. It used to be the custom to wear yellow clothing on Basant Pañcamī. This is still done by the local Baniyā family and a few others in the village. Starting on Basant Pañcamī, wood is collected for Holī, particularly a pole or "foundation stick" for the bonfire. A fast is observed by some women at Rāmpur, and some cook special foods, but in general little attention is paid to Basant Pañcamī. It is not mentioned by McKim Marriott in his list of festivals at Kishan Garhi, but he informs us that it is observed there on a small scale.[41] No fairs are held in the neighborhood of Rāmpur on this occasion.

SIV RĀTRĪ

Siv Rātrī, or Bholai-kā Barāt (Bholai being one of Siva's names), is a festival in honor of Siva which falls on the thirteenth Badi of Phāgun (February-March). After an early morning bath, the villagers fast until about 2 P.M. No cereals are eaten then, but *lapsī*, berries, and *cholai*-seed sweets may be consumed. At about one o'clock the women of Rāmpur gather in extended-family or *thollā* groups and walk together singing to Siva's temple at Rasulpur. Each woman carries a metal dish with a little earthen *ghī* lamp, a few berries, some flour, and a pot of water. She pours the water on the cylindrical stone *linga* which represents Siva and places her *ghī* lamp there, together with the berries and other things she has brought along. These offerings are taken by the Gosain who lights a lamp in the Siva temple every day. This office was said to have been formerly held by a Brāhman, but nowadays a Gosain is hired by the Baniyā who built the temple.[42]

[39] Stevenson, *op. cit.*, 272 ff.

[40] Gupte, *op. cit.*

[41] "Near Kishan Garhi observances were much more extensive in towns and cities. It is a major holiday of Ārya Samājists and of other sects such as Sikhs and Siva Narāyanis." (Personal communication.)

[42] According to Ibbetson, Brāhmans should not be temple priests at Siva temples. "No Brāhmans can partake of the offerings to Shiv, or be priest in his temple,

After bathing Siva's *linga*, the women come home again, singing songs. Their fast is broken by drinking whey, prepared by adding fresh water to milk. No cereals are eaten until the following day. About three-fourths of the women in Rāmpur observe this fast—ill or pregnant women being required to abstain from it. Only about a dozen men observe the fast, however. Those who do so go early in the morning to the temple, so as not to be laughed at by others. (This, at least, is what some of the villagers say.) Some of the local schoolboys, who are told about the festival by their teachers, fast on Siv Rātrī. The fast is observed mainly by Brāhmans, Jāṭs, Baniyās, and Kumhārs, but not by Camārs, Bhaṇgīs, and Dhobīs. Untouchables are not admitted to the temple to see Siva's *linga*.

The Siva temple at Rasulpur attracts women from the three adjoining villages, including Rāmpur. But there are larger temples, with inns for pilgrims, at Madipur (5 miles from Rāmpur), Kundal (9 miles), and Seoli (12 miles), where there are big fairs, with wrestling matches, etc., on Shiv Rātrī. About twenty people from Rāmpur go to one of these temples and attend the fair.

HOLĪ

Holī, which comes on the fifteenth Sudi of Phāgun (February-March) and lasts through the first day of Cait, is one of the most popular and widespread Hindu festivals, having a particular appeal for the lower castes and younger age-groups. A month of preparation leads up to Holī. At the time of Basant Pañcamī the main pole for the Holī bonfire is selected, and boys start to collect wood for the fire. (Wood is scarce in this region, so the boys keep close watch on their firewood.) During this time, too, the women of Rāmpur gather in extended-family groups in the evening to sing songs. Young girls do the singing during the earlier half of Phāgun, but they are joined by the older women after Amāvas. Some women throw water on others, not just on the day of Holī, but throughout the month of Phāgun.

On Holī day itself the women fast until late afternoon, but they keep themselves busy in the morning by collecting color-pots and by preparing food—rice, pancakes, brown sugar, and *hālvā*. In the afternoon, at around two o'clock, the women walk in extended-family groups, singing songs, as they approach the Holī pyre, all dressed in their best clothes and ornaments. Every woman carries a metal dish laden with cow-dung wreaths, cotton strings, turmeric, brown sugar, and a pot of water. Some also have small *ghī* lamps made of flour. The women's palms and soles are stained with henna, applied the night before. On reaching the Holī pyre, each woman takes off her shoes and walks around the pyre once, twice, or three times, pouring water from her pot and placing cow-dung wreaths on each of the corners. She ties some yarn around the pyre, and if she has brought a lamp with her, lights it there. Turmeric marks are placed on the pyre and on her children as well; and flour and brown sugar are given to the Brāhman from Rasulpur who sits there, accepting offerings. After this worship, the women return, singing, to their homes and break their fast.

In the evening both men and women go to the Holī pyre, but not in their best clothing. They wear clothes which are clean, but which they do not mind dirtying. In former days a Brāhman fixed the proper time for lighting the pyre, and was the one who started the fire. (As soon as he had done so, he used to run with a burning dung-cake towards the pond, which signified the sea.) But nowadays any boy may start the fire. As it begins to burn, children set off fire-crackers, while the women continue singing songs. But as the fire mounts higher, the people start to throw water on each other and rub *gulāl* (red oxide) into each other's faces. This may develop into a conflict between the sexes, with much shrieking and laughter, as young girls throw red powder at their husband's younger brothers, and *vice versa*. Older people are not as actively involved as the young in this horseplay, which may go on for two or three hours. As it finally dies down, people go back to their homes to sing and dance until late at night.

Sometimes people put barley-stems into the Holī fire, to test the ripeness of the crop; they also watch the direction of the flames, for it is

though they will worship him and sometimes assist in the ceremonies, thus deviating from the strict rule of the original cult. On the Sheoratri, on the thirteenth of Sāwan and Phāgan, such people as have fasted will go to the Shivāla; but it is seldom entered on any other days." (Ibbetson, Sir Denzil, *Report on the revision of settlement of the Panipat Tahsil and Karnal Parganah of the Karnal district, 1872–1880*, 147, Allahabad, Pioneer Press, 1883.) He states that Siva temples are built without exception by Baniyās, and their priests are *gosains*. (*Ibid.*, 146.)

believed that this shows which part of the country will be benefited.[43]

The great-tradition legend of Holīkā is told at Rāmpur to account for the festival. The legend seems to have variations in different parts of India, but they generally agree in having a hero (Prahlād) who is not burned while he is held in the lap of his aunt, Holīkā, as she sits in a blazing pyre. In the Rāmpur version Prahlād is a devotee of Rāma; the villain of the story is his father, who tries to make Prahlād abandon the worship of Rāma. The father makes several attempts to murder his son, but fails and is finally killed in the end.

On Dulhendī, the day after Holī, the celebrations continue, with some interesting modifications. Women are now forbidden to throw water at the men, while the men may continue to throw water at women. But the women have the significant privilege of using sticks and of beating up the men, including those of higher castes. Brother-in-law—sister-in-law rivalry continues, but now a girl may give a drubbing to her husband's younger brother. One young man was given seventeen strokes of the stick (until it broke) by his sister-in-law this year, after he threw some cow urine at her. A woman may also beat her husband's older brother, but not her father-in-law. Incidentally, the women keep their faces respectfully covered with veils, while beating their menfolk. Girls do not beat their brothers but only brothers-in-law and those outside the family.

Some lower-caste women hold up people passing through the streets and demand money from them. If the man pays, he is allowed to pass; otherwise he is given a drubbing. A few years ago a sub-inspector was held up in this way, but he saved himself with a five-rupee note. (A rupee is the usual tariff.) A Brāhman from Rāmpur, on the other hand, was struck so severely across the legs that they ached a month later. Cases of this kind are not taken to the courts, and no doubt some people take advantage of this immunity, beatings being sometimes administered at the instigation of a woman's husband. Most of the horseplay at Holī, however, takes place among the members of a few joint families who play together.[44]

The women enjoy the advantages they possess on Dulhendī. Of about twenty women interviewed in five different groups, all expressed unanimous enthusiasm for the custom. They said that men beat women on all the other days of the year; why shouldn't there be a day when the situation is reversed? Not all the women wield sticks on Dulhendī, but those who do not can look on as spectators and get at least vicarious satisfaction.

The villagers claim that the use of sticks is an innovation, introduced only about five years ago. Formerly, women beat their husbands symbolically with their veils. Then the veils gave way to little sticks, and the little sticks to larger sticks. Now 2½-yard sticks are used for beatings. However this may be, the custom seems to be widespread in India and not very recent. Fuchs describes the festival of Jhenda, five days after Holī, in which the women of his untouchable group, the Balahis, wield sticks unmercifully:

> The women do not spare the men, and many a man feels the pains of his sore and swollen back for days after. Some women have taken a glass of country liquor or a pinch of *bhang* (hemp) before the performance, to bolster up their courage. They are half-drunk and so excited by the noise and the fighting that at last they attack the whole crowd of village people who stand around shouting and laughing and enjoying the whole thing immensely. If the women can get hold of the *patel* and the *kotwal*, they beat them until these men buy themselves free by a small present.[45]

Briggs also describes Camār women as carrying sticks on the days after Holī and demanding gifts from people.[46]

Holī is one of the four main festivals of the year at which *sidha* is sent to the daughters or sisters of a household. Some families provide only rice, brown sugar, and a rupee; while others send from two to five rupees in cash. A brother

[43] Mrs. Stevenson reports the same traditions: "Directly the fire is lit, the wise old people of the village watch the direction of the flames with the keenest interest, for the land over which they and the smoke blow will be specially fertile during the year. In the same way, after the fire is out, and when all is over save the shouting, they dig up the pot of grain. . . . If all the grain is well cooked, there will be no fear of famine; if it is well cooked in one part, say the part of the pot facing north, and uncooked towards the southern part of the pot, then the lands to the south of the village will be unfertile, and even famine-stricken, whilst the northern fields will yield a bumper harvest. . . ." (*Op. cit.*, 284.)

[44] McKim Marriott informs us that this is not the case at Kishan Garhi or in its neighboring villages, "where sometimes all castes and groups pitch in, Bhaṅgī women beating and joking with Brāhman men, etc." (Personal communication.)

[45] Fuchs, *op. cit.*, 300–301.

[46] Briggs, *op. cit.*, 118.

or nephew may take the presents to the girl a few days before Holī.

AMĀVAS

An account of village festivals would be incomplete without mention of Amāvas, the monthly moonless day. According to Mrs. Stevenson, it is an inauspicious day, on which one should not take more than one meal, wash clothes, or use soap when bathing. Women should not sew or grind grain, and men should not hunt or fish. Carpenters, coolies, and artisans do no work on Amāvas.[47]

In Rāmpur these taboos are not closely observed. Everyone works on this day, although some people go to bathe in the Jumna River. Oxen are given a holiday, however, and are not put to the yoke. If Amāvas falls on a Monday—a sacred occasion—about a dozen people from Rāmpur go to bathe in the Jumna. It used to be customary to feed Brāhmans on Amāvas, but this is no longer widely observed, partly owing to the Jāṭs' reluctance to feed the Brāhmans, and partly because the Brāhmans consider the charity beneath their dignity. Some people feed a *chappāttī* to a cow instead.

DISCUSSION

We come now to a general consideration of the festivals. Before turning to the questions raised in our introduction, we may note some broad characteristics and general patterns. Eighteen of the twenty festivals celebrated in Rāmpur are religious festivals. Tīj and Basant Pañcamī are the exceptions, but of these the latter is barely observed, although it is a national holiday.[48] Tīj is thus the only secular festival of importance. National holidays such as Republic Day (January 20), Independence Day (August 15), and Gandhi's birthday are not celebrated in the village, nor are the holidays set aside for Muslim, Christian, and Sikh festivals. Bhārata Milap and Baisākhi are other national holidays ignored at Rāmpur.

About half the Rāmpur festivals are either universal or at least widespread in Hindu India: Rākhī Bandhan (Silono), Janam Aṣṭamī, Kanāgat, (Srāddha), Niortha-Dasahrā, Divālī, Devuṭhāni Giās, Makar Sankrant, Holī, Siv Rātrī, Basant Pañcamī, and the Devī festivals. Some have a fairly wide regional distribution: Tīj, Karvā Cauth, and Gūgā Naumī. Ghantal Deo and Hoi have a very limited distribution, although Hoi is found in the city of Delhi. These two festivals, as well as Gūgā Naumī, are not given in Marriott's list of the festivals at Kishan Garhi, nor do they appear in Wiser's list for Karimpur. Rāmpur, on the other hand, does not have some festivals mentioned by Marriott, such as Buṛho Bābū-kī Pūjā ("Old Clerk's Worship"), and Kuē-kā Devatā-kā Melā ("Fair of the Well Godling"),[49] and it lacks some of those listed by Wiser, such as Nāg pañcamī, Khān Bahādur-kā Melā, Bhim Ekādasi, and Ānant Chaudas.[50] All of these villages, then, although they are not far apart from one another, have certain local festivals in addition to the more familiar great Hindu festivals. At Rāmpur there are some deified human beings, such as Gūgā pīr and Sānjhī whose cults are regional, while other deities who are venerated elsewhere are given little recognition. *Gaṇeśa caturthī* in honor of Gaṇapati or Gaṇeśa, the elephant-headed god, is not observed at Rāmpur; nor is Hanumān given homage as in the south.

According to Ibbetson, the people of the Karnāl tract with which he was concerned (located close to Rāmpur and with a similar ethnic composition) are Vaishnavas. The name of Viṣṇu is rarely mentioned there. "But under the name of Rām and Narāin he is the great god of the country. . . . He is worshipped under the name of Rām by Rājpūts only; under the name of Narāin by other castes."[51] But the present inhabitants of Rāmpur could not well be called Vaishnavites. The latter term seems to have been used quite broadly by British administrators.[52] Elsewhere Ibbetson paints a rather different picture:

[47] Stevenson, *op. cit.*, 260 ff.

[48] As noted in footnote 41, Basant Pañcamī is a religious holiday for some sects in other communities, and it is possible that Tīj may have religious associations elsewhere. Both may have been religious festivals in the past, but are not now at Rāmpur.

[49] Marriott, *op. cit.*, 192.

[50] Wiser, *op. cit.*, 84 ff., 1936.

[51] Ibbetson, *op. cit.*, 146, 1883.

[52] In Rose's glossary (based partly on Ibbetson's material) we read that "The Hindu, generally speaking, is not a Shaiva but a Vaishnava, that is to say, he does not eat flesh, onions, or garlic, and does not drink spirits. The main features of the Hindu pantheon are revealed to him in Vishnu or the incarnations of Vishnu. . . . He is, in fact, the orthodox Hindu, and in our returns the word Vaishnav means, as a rule, little more than this. . . . The numbers returned at our census as Vaishnavas exceed greatly the numbers returned under any other sect." (Rose, *op. cit.*, 366.)

The student who, intimately acquainted with the Hindu pantheon as displayed in the sacred texts, should study the religion of the Hindus of the Tract, would find himself in strangely unfamiliar company. It is true that all men know of Shiv and of Vishnu; (Footnote: Brahma is never mentioned save by a Brāhman; and many of the villagers hardly know his name) . . . but his daily concerns in his work-a-day world are with the host of deities whose special business it is to regulate the matters by which he is most nearly affected.[53]

Indeed, in this region of early Aryan settlement, where the local religion, as Marriott puts it, "must have been subjected to constant Sanskritization over a period of about three thousand years,"[54] one is surprised to find so much that is outside of the Sanskritic Hindu "great tradition" —such as the worship of the Mātā deities, Bhuiyān, Ghantal Deo, Gūgā pīr, Sānjhī, and Hoi. For Kishan Garhi—about one hundred miles from Rāmpur—Marriott points out that fifteen of the nineteen village festivals are sanctioned by one or more Sanskrit texts. These include: Ekādaśi, Patthvārī Pūjā, Pitar kī Pūjā, Tīj, Rākhī Bandhan, Janam Aṣṭamī, Kanāgat, Naurthā, Dasahrā, Divālī, Gobardhan, Devuṭhān, Sakaṭ, Siv Rātrī, and Holī.[55] Twelve of these festivals are found in Rāmpur. But as Marriott also points out, these festivals represent only a small selection out of the total annual cycle of festivals which finds sanction in the great tradition, and the festivals contain much ritual which has no evident connection with the great tradition.[56]

In how many of the festivals of Rāmpur do the great deities of the Hindu tradition play an important part? We can point to only five with certainty: Siv Rātrī, in which Siva is honored; Janam Aṣṭamī and Gobardhan in which Kṛṣṇa is given homage; Divālī, in which Lakṣmī is worshipped; and Devuṭhāni Giās, in which the gods are awakened.[57]

We had the general impression that the great Hindu deities were not well known to the villagers of Rāmpur. To get more information on this point, a questionnaire was submitted to twenty-five villagers to find out how familiar they might be with the Hindu deities. Fifteen of our subjects were Jāṭs, five Brāhmans, two Kumhārs, three Camārs. This sample roughly follows the caste distribution in the village. However, there was only one woman in the group, a sixty-year-old Jāṭ. The subjects were asked to identify the following gods and the powers they represent: Indra, Viṣṇu, Siva, Brāhma, Kālī, Agni, Yāma, Lakṣmī, Sarasvatī, Kuber.

Members of the oldest group (over forty) averaged five correct answers out of ten, with Indra, Yāma, Lakṣmī, and Sarasvatī being identified by all. Brāhma and Viṣṇu were identified by three each and Siva by two. Agni, Kuber, and Kālī were not identified. The average of correct answers dropped from five to three in the lower age groups.

Some aspects of these replies are puzzling. Indra is an ancient Vedic god who plays only a small part in modern folklore and present-day worship. His correct identification is higher than one might have expected, while the identifications of Siva and Viṣṇu are much lower. Perhaps the difficulty in the latter case is simply one of terminology. If other names for Kālī and Siva had been given (Devī, Bholai, etc.) the results might have been different. Marriott writes in a personal communication:

> In Kishan Garhi I was at first non-plussed by villagers' failure to respond to my questions about Siva; later I found I could elicit a great deal of information by asking the same questions about their name for him—Mahādev. Ultimately, I found villagers to be acquainted with quite esoteric lore of the same deity, and to know him also by many other names of uncommon sort, such as Bāwa.

It is also possible that female subjects might have made a higher score on these questionnaires than the men. The women of Rāmpur are more conservative than the men and are more familiar with the songs about the gods sung at festival times. Some of the women serve as festival story-tellers on these occasions.

The conclusions to be drawn from the questionnaires are therefore not clear-cut. It is to be noted, however, that the stories of the Ramāyana and Mahābhārata are poorly known at Rāmpur. "The Ramāyana is to the peasants of North India what the Bible is to Englishmen," says O'Malley.[58] But many of the villagers do not know this Bible very well, as is evidenced by

[53] Ibbetson, *op. cit.*, 142, 1883.
[54] Marriott, *op. cit.*, 193.
[55] *Ibid.*, 193.
[56] *Ibid.*, 194.
[57] According to Crooke, the purpose of the latter festival is to awaken Viṣṇu (*op. cit.*, **2**: 300); but in Rāmpur it is "the gods" in general who are summoned. The same appears in Ram Ratan's study of the Bhangīs of Delhi.
[58] O'Malley, *op. cit.*, 58.

the replies to another part of our questionnaire, in which they were asked to identify mythical figures drawn from the Ramāyana and Mahābhārata. The familiar tale of Rāvana is not well known to the villagers. This story is usually enacted by *Rām-Līlā* troupes at the time of the Dasahrā celebrations in North India, but no such performances have been held at Rāmpur for the past twelve years or more, and the younger villagers are not familiar with the legend, except for those who have learned it at school.

The general impression remains, then, that the Hindu "great tradition" is not as familiar to these villagers as one might have expected, whereas the worship of local godlings and disease goddesses, etc., is very important. This supports the statement by Rose quoted at the beginning of this paper.

THEMES AND RECURRENT PATTERNS

To turn to another question, what are the themes and purposes of the festivals? Do they have any recurrent, common patterns, or is there much differentiation? To be sure, the "purpose" of festivals is not always clear-cut; they may serve multiple ends. With this proviso, the following rough grouping may serve: Two festivals are for protection from sickness (Bāsora, Devī-kī Karahī), three are for purification (Jaithkā Dasahrā, Ganga-Jumna Nahan, Makar Sankrant), six are for the honoring of deities (Ghantal Deo, Janam Aṣṭamī, Gūgā Naumī, Niorthā-Dasahrā, Devuṭhāni Giās, Siv Rātrī). The other festivals are not so easily grouped. Kanāgat is for the honoring of ancestors, Karvā Cauth for the honoring of husbands, and Hoi for the honoring and protection of children. Tīj, Basant Pañcamī, and perhaps Holī may be described as festivals which celebrate the change of seasons.

In general, it does not seem that there is any major theme or emphasis running through all the festivals, such as some ethnologists have found in the ceremonial cycle of groups such as the Hopi or Navaho, in which a stress on fertility or health may be detected in most phrases of ritualism. Rather, one gets an impression here of diversification, as if the festival cycle were trying to cover as much ground as possible, giving a due amount of homage to a variety of gods, spirits, and human relationships. Marriott has commented upon this diversification from a different, though related, angle in his discussion of Kishan Garhi:

> There is no temple of the whole village, no one cremation ground, no sacred tank or well. Instead, dozens of different trees and stones and tiny shrines are made the object of worship separately by members of the many caste and lineage groups.[39]

If overall common themes are not evident in the festivals, there are some ritual and social practices which do recur frequently. Food is offered at most festivals—to the gods, or to Brāhmans, beggars, bystanders, cows, or crows; and sweets are frequently distributed. Mud is dug up from the river on some occasions (Devī-kī Karahī, Ghantal Deo); at both of the latter festivals a child's hair is cut for the first time. But perhaps the most interesting of the recurrent patterns is the custom of joint-singing and worship by a group of women who are generally drawn from one, two, or three joint families. (Bāsora, Ghantal Deo, Tīj, Niorthā-Dasahrā, Devuṭhāni Giās, Makar Sankrant, Siv Rātrī, Holī). At some of the women's festivals an image (usually of a female deity) is drawn or constructed and worshipped, and one of the women in the group tells a story (Niorthā-Dasahrā, Karvā Cauth, Hoi, Devuṭhāni Giās). Men are excluded on these occasions. This female solidarity—which reaches a climax at Dulhendi when women beat men with sticks—is a striking feature of the festival cycle.

This raises the question whether the significance of the festival cycle may not be quite different for men and women. It may be noted that the men of Rāmpur have a more regular and active social life, with hookah groups forming every day in the *baithak*, or male quarters of the household. Women, however, have fewer opportunities to get together; the festivals provide their big moments. Perhaps it is largely for this reason that the women are so much more conservative than the men in religious matters. For the perpetuation of the festival cycle seems to be largely in their hands. There are five festivals for women only; none for men only. Moreover the women seem to play the major roles in some of the other festivals, such as Tīj, Ghantal Deo, and Siv Rātrī. To be sure, male participation is often essential; the head of the family must worship Lakṣmī on Divālī and "cowdung-wealth" on Gobardhan, and only a male son can perform a *srāddha* for the family dead. But most of the festival activities are carried out by the women. It is they who do all

[39] Marriott, *op. cit.*, 175.

the cooking and cleaning on festival days, and it is they who are most assiduous in worshipping at shrines, lighting lamps, fasting and taking vows. The men may sometimes scold them about honoring a particular godling, but this has little effect. As one woman, aged forty, remarked, "Our menfolk keep on telling us not to do this or that, but we go on worshipping our gods, goddesses, and godlings just the same."

Another point may be made about differential sex roles. The principal deities worshipped by the women seem to be female (the Mātās, Devī, Sānjhī, and Lakṣmī), and the stories told at Hoi and Karvā Cauth are about women. Male deities are also honored, of course (Ghantal Deo, Gūgā pīr, Bhuiyān, Kṛṣṇa, and Siva), but the deities most concerned with the vital personal matters of life—such as childbirth and the protection of children from sickness—are goddesses. This is such a widespread pattern in India that it may reflect an ancient pre-Vedic cult. Whitehead[60] and Elmore[61] have described the goddess worship of South India, in which one commonly finds a cult of seven sister-deities, mostly concerned with diseases. It is interesting that Rose has described the seven-sister theme for the Punjab:

> Sītala, the small-pox goddess, also known as Māta or Devi, is the eldest of a band of seven sisters, by whom the pustular group of diseases is supposed to be caused, and who are the most dreaded of all the minor powers. The other six are Masāni, Basanti, Māhā Maī, Polamde, Lamkariā, and Agwāni, whose small shrines generally cluster round the central one to Sītala.[62]

Bloody animal sacrifices to the goddesses are not the rule in this region, as they are in the south, however.

Another recurrent element in the social aspect of festivals is their utilization for the strengthening or re-affirmation of family ties—especially in connection with married-out daughters or sisters. Every family tries to send gifts to its daughters at each of the four main festivals—Tīj, Divālī, Makar Sankrant, and Holī. On the first Tīj after a marriage, a special gift is sent to a daughter-in-law, who may still be living with her parents. Another occasion for the offering of presents is Silono, when a girl ties a *ponchi* to her brother's wrist and receives a rupee or so in exchange. Gifts sent to daughters usually consist of rice, brown sugar, *ghī*, clothing, bangles, and henna. Well-to-do families send complete dresses to their daughters and their children; others send a shirt and a veil to the daughter and a shirt for each child—presents to which all the brothers in an extended family are expected to contribute. The festival of Makar Sankrant is supposed to be an occasion for the patching up of quarrels, especially in the case of a girl and her in-laws, and she gives presents to them on this occasion. Family solidarity is also expressed at Kanāgat, when the family dead are honored.

Other ties are affirmed at the festivals as well, village or *gotra* solidarity being emphasized by the worship of Bhuiyān and Ghantal Deo. At least five of the twenty festivals celebrated at Rāmpur provide opportunities for the people of neighboring villages to meet (Ghantal Deo, Devī-kī Karahī, Tīj, Ganga-Jumna Nahan, and Siv Rātrī). Fairs also provide an occasion for social interaction in a larger regional setting. On Siv Rātrī there are fairs at Madipur, Kundal, and Seoli, which attract a thousand people or more; there is also a large fair at Bahādurgarh on Silono. Some people from Rāmpur generally attend these fairs. Pilgrimages to Berī, to the Jumna and Ganges Rivers and to other sacred places also take people out of the village, while there are some festive occasions which bring outsiders into Rāmpur. People from other villages, for example, come to worship Ghantal Deo in Baisākh. And sometimes a Camār gives a big feast on Devī-kī Karahī, inviting the Camārs from neighboring villages to attend.

CASTE PARTICIPATION

Sixteen of the twenty festivals are celebrated by all castes in the village. Ghantal Deo and Siv Rātrī are not celebrated by the lowest castes—Camārs, Bhaṇgīs, Dhobīs, and Jhīṉvars. When Brāhman priests officiate, they do not accept the offerings of untouchables. Nor are the latter admitted to Siva's temple to see the *linga*. The lower castes observe Devī-kī Karahī

[60] Whitehead, Henry, *The village gods of south India*, 2nd ed., Crown, 1921.

[61] Elmore, Wilber Theodore, *Dravidian gods in modern Hinduism*, Lincoln, Nebraska, Univ. of Nebraska (Ph.D. Thesis) 1915. See Elmore's chapter on the Seven Sisters, 19 ff.

[62] Rose, *op. cit.*, 350. For a similar description, from which Rose has probably drawn, see Ibbetson, *op. cit.*, 149. The seven-sisters pattern also appears in West Bengal. See Bhattacharyya, Asutosh, The cult of the village gods of West Bengal, *Man in India*, Ranchi **35** (1): 20, January-March, 1955.

more than do the higher; only about half the Jāṭs do so. Karvā Cauth is observed only by Brāhman, Baniyā, and Kumhār women—not by Jāṭs. On Basant Pañcamī only the single Baniyā family in Rāmpur and a few Brāhman families observe a fast. Some mingling of caste groups takes place at festivals such as Tīj and Holī, but for the most part caste lines are carefully drawn. When the women sing Holī songs in the month of Phāgun the women of one caste sing together. Brāhmans, Baniyās, and Khātīs may sit with the Jāṭs, but the others sit separately. At Tīj the same distinctions hold. A Brāhman or Baniyā woman may use the same swing as a Jāṭ, but a lower-caste woman would not be allowed to do so. When the women go to worship Mātā or Devī, they go in extended family groups, and the different castes take turns in worshipping the goddess. One group waits until the other is through. In worshipping Sānjhī the women of one caste form groups to prepare Sānjhī figures. Women of another caste are never admitted. On Devūṭhāni Giās the women of one, two, or three extended families sit together to burn cow-dung cakes and eat *chorma*; these are always members of the same caste. The same is true of the women who meet to sing songs at Janam Aṣṭamī, or to hear stories told at Hoi and Karvā Cauth. Most of the horseplay at Holī takes place within the same caste. However, there are licensed exceptions to the rules at Dulhendi, when the lower caste women may beat up a higher-caste man. While the festivals do bring people together, then, it cannot be said that they over-ride caste lines. Social integration does not extend so far. Although the aggressive practices at Dulhendi may serve as a safety-valve to some extent, they also draw attention to caste tensions and conflict.

THE FESTIVALS, ECONOMIC PRODUCTION, AND EXPENDITURES

May the festival cycle be said to inhibit economic production? Do the celebrations consume much-needed capital, and do they take up a disproportionate share of the villagers' time? To be sure, there is a rather hard-boiled value judgment underlying this question, which ignores the emotional and socially "functional" benefits of the festival cycle, and perhaps it could only be raised by a Westerner who comes from a secular civilization with rationalized production and a cult of efficiency. Nevertheless, the question does have significance in connection with the current efforts being made to raise India's agricultural productivity and standards of living.[63]

Let us first consider the amount of time consumed by the festivals at Rāmpur. Here we may note that sixteen of the twenty festivals are of one-day duration only. Divālī lasts for three days and Holī for two. Dasahrā is celebrated for only two days, although evening festivities take place over a ten-day period. Technically, Kanāgat or Srāddha lasts for fifteen days, but in practice the observances are usually limited to four or five. This gives us about twenty-eight "workless" days, which is not much, considering that the villagers do not have free week-ends in the Western sense. Eight of the twenty festivals coincide with holidays set aside by the Government of India or the Delhi State Government. But national holidays are often ignored by the villagers, as is Amāvas, traditionally the monthly day of rest.

Actually, the festival days are not "workless" at all. Twelve of the festivals celebrated in Rāmpur fall during the four months from Sāvan to Kātik. This is a busy season; yet no loss of manpower seems to result from the festivals, because some of them are limited to the women, and most of the celebrations take place in the evenings. Three of the five festivals in Kātik are for women only (Karvā Cauth, Hoī, and Devuṭhāni Giās. In Asauj most of the Niorthā-Dasahrā observances are carried out by women. Men's work in the fields, therefore, proceeds much as usual at these times.

Some of the other festivals come during slack seasons. At Tīj, for example, ploughing cannot be done because of the heavy rains. Four festivals fall during the summer months between March and June, when work is relatively light. These festivals too, especially Bāsora, Devī-kī Karahī, and Ghantal Deo, are celebrated primarily by the women, who make their observances in the early mornings and evenings. At Kanāgat or Janam Aṣṭamī, when fasting takes place, it is generally only one man in a family who stays home to fast, while the others go out to the fields. Viewed in this light, it cannot be said that the festivals consume a dis-

[63] See Moore, Frank J., A note on rural debt and control of ceremonial expenditure in India, *Economic development and culture change* 2 (5): 408–415, Chicago, Univ. of Chicago Press, June, 1954. See also Anstey, Vera, *The economic development of India*, 55, New York, Longmans, Green, 1939.

proportionate amount of the people's time in Rāmpur.

As for expenditures, the main expenses at festival times are for food and gifts. The gifts, itemized in a previous section, are primarily for daughters of the family, including the sisters and aunts of the family head as well as his daughters. Others who receive gifts at festival-time are Brāhmans and people who work for the family in a *jajmānī* relationship. Brāhmans may receive a half to one *sīr* of grain at each of the main festivals. A Brāhman also receives some grain at Silono in exchange for the *ponchi* he leaves at a household. He is entitled to a handful of grain at Dasahrā and a full meal at Makar Sankrant. The Brāhmans who sit at the shrine of Ghantal Deo, at Siva's temple, or beside the Holī pyre all receive offerings—usually flour and brown sugar, with sometimes a few berries. People who have gone to bathe in the Ganges at Ganga-Jumna Nahan should give a meal to a Brāhman on returning, and the Brāhman who visits a household at Kanāgat must similarly be fed.

However, in the case of the Brāhmans, these customs are now losing force, and cows or young girls are often substituted for them. The local Brāhmans are not at all eager to fill their traditional roles and look on the receipt of charity as demeaning. Although Brāhmans from nearby villages have been carrying out these functions in their place, it seems likely that the expenditures for Brāhmans have been going down in recent years.

The same may be said of the expenditures to people who work for the family in a *jajmānī*

Festival	Kumhār, 1B (very low) (5 family members)	Jāt 1B (high) (7 family members)	Jāt II (12)	Jāt III (14 family members)
Bāsora	1-14-0	6-8-0	11-4-0	5-14-0
Devī-kī Karahī	3-0-0	8-8-0	15-5-0	15-8-0
Ghantal Deo	2-4-0	9-0-0	7-4-0	9-9-0
Jaith-kā Dasahrā	—	—	—	—
Tīj	9-8-0	15-14-0	16-12-0	13-4-0
Kothli for one girl:	2-6-0	18-8-0	25-0-0	27-0-0
Silono	6-12-0	5-4-0	15-4-0	7-12-0
for 1 sister:	1-0-0	7-0-0	2-0-0	2-0-0
for Brāhman:	0-4-0	7-0-0	0-8-0	1-0-0
Janam Aṣṭamī & Gūga Naumī	4-6-0	6-8-0	14-12-0	11-5-0
Kanāgat (for 1)	5-10-0	7-6-0	12-13-0	5-8-0
Niorthā-Dasahrā	0-11-0	2-0-0	3-9-0	3-8-0
for food:	1-0-0	11-9-0	12-13-0	12-4-0
Devī-kī Karahī (II)	3-0-0	8-8-0	14-5-0	15-8-0
Karvā Cauth	3-0-0	—	—	—
Hoi	3-0-0	3-6-0	6-8-0	9-0-0
Brāhman & c.	0-12-0	0-12-0	0-12-0	0-12-0
Divālī	5-0-0	22-9-0	40-9-0	40-8-0
Sidha for girls:	4-0-0	7-4-0	16-0-0	32-8-0
Devuṭhāni Gīās	4-2-0	6-8-0	10-0-0	8-8-0
Ganga-Jumna Nahan	1-0-0	6-8-0	14-12-0	15-8-0
Makar Sankrant	6-12-0	7-14-0	8-10-0	14-8-0
for Brāhmans:	0-10-0	1-0-0	1-14-0	1-8-0
for girls (*sidha*)	4-0-0	7-4-0	16-0-0	32-8-0
Basant Pañcamī	—	—	—	—
Siv Rātrī	1-8-0	3-7-0	4-4-0	4-13-0
for Brāhman:	0-3-0	0-5-0	0-5-0	0-7-0
Holī	5-0-0	8-14-0	19-0-0	23-8-0
Sidha for girls:	3-0-0	7-4-0	16-0-0	32-8-0
Amāvas	3-12-0	6-9-0	7-4-0	11-4-0
Summary:				
Total expenditures on food at festivals:	65-3-0	145-7-0	243-8-0	239-8-0
Money spent on *kothli* for a daughter:	2-6-0	18-8-0	25-0-0	27-0-0
Money spent on 1 *sidha:*	4-0-0	7-4-0	16-0-0	32-0-0
Money given to a sister for *ponchi:*	1-0-0	2-0-0	2-0-0	2-0-0
Money given to Brāhman:	1-12-0	3-1-6	3-7-6	3-9-0

relationship. The *jajmānī* system is weakening at Rāmpur. Some of the lower castes, like the Camārs, no longer carry out all of their traditional obligations and services. Their former *jajmāns* therefore give them fewer gifts at festival times. Some of the Bhaṇgīs, Dhobīs, and Kumhārs, however, have remained faithful to their *jajmāns*, and receive presents. The Bhaṇgīs and Kumhārs at Rāmpur still get offerings of porridge, veils, etc., at the shrine of Mātā on Bāsora day, although they no longer care so much for this charity. The Kumhārs also get some grain for the pots used at Hoi, and gifts of grain may be given to the lower castes informally on other festival occasions.

A few words may be said about the special foods prepared at festivals. These are often held to be the main feature of a festival, for one may then eat things rarely prepared at other times in the year, such as vegetables, or rice, which is not a staple food among these North Indian villages. *Khīr*, rice milk pudding, or rice served with brown sugar are very popular. Other festive dishes include *hālvā*, *lapsī*, and *pūrīs*. The chief festivals for the preparation of foods are Tīj, Divālī, and Holī. The expenditures for these festivals is nearly twice that spent on the others. Special sweets are included in the *sidha* sent to a daughter at Tīj. But everyone in the family enjoys the good food prepared at festival times. This periodic supply of extra calories must fill a real need for the people and could hardly be termed an extravagance.

Data on expenditures at festivals were collected from four families at Rāmpur, each representing a different socio-economic group. According to our data, the lowest-income family spent half as much on food as the others. The money spent on *sidha* (for a daughter) showed a great range from 4 rupees to 32 rupees, 8 annas. The expenses for *kothli* at Tīj showed less variation, although the poorest family of our group spent one-sixth of the sum expended by the richest. The poorest family gave about half as much as the others to Brāhmans, while the other three families spent about the same amount. The sums given to sisters or daughters at *ponchi*-tying show the same patterns, with the upper three families spending about the same amount and the poorest family again spending about half as much.[64]

[64] The sums are given in rupees, annas, and pice. The figures IB, II, III refer to relative positions on a socio-economic scale which was applied to Rāmpur as part of the general study. Point scales were devised for the qualification of each of the following traits: landownership, land cultivated, housing, outside income, highest school grade completed, and school attendance. Each family received a point score for each trait and also a total score. It was found that the families clustered into three socio-economic groups which were designated from lowest to highest, as Group I (with sub-groups *a* and *b*), Group II, and Group III. Lewis, Oscar, Group dynamics in a North-Indian village, *The Economic Weekly* **6** (16): 448, Bombay, April 17, 1954.

STABILITY AND CHANGE

At about 1030 A.D. the Muslim scholar, Alberūnī, who passed through this region of north India in the train of Māhmūd of Ghāzni, wrote an account of India in which there are some descriptions of fasts and festivals so similar to those current in present-day Rāmpur that the evidence for cultural stability is remarkable. A few quotations will make this clear:

> Devuṭhāni Giās: When in the month of Kārttika the moon stands in Revatī, the last of her stations, it is a fast-day in commemoration of the waking up of Vāsudeva. It is called deotthinī, i.e., the rising of the Deva.[65]
>
> Divālī: The 1st Kārttika, or new moon's day, when the sun marches in Libra, is called Dībālī. Then people bathe, dress festively, make presents to each each of betel-leaves and areca-nuts; they ride to the temples to give alms and play merrily with each other till noon. In the night they light a great number of lamps in every place so that the air is perfectly clear.[66]
>
> Siv Rātrī: On the . . . night . . . of the 16th, called Sivarātri, they worship Mahādeva during the whole night; they remain awake, and do not lie down to sleep, and offer to him perfumes and flowers.[67]

Some of the festivals described by Alberūnī must have been ancient before his visit to India. In the case of Divālī, at least, P. K. Gode has traced the festival's existence back to about A.D. 100.[68] It may well be much older. Several of the festivals described by Alberūnī are no longer current, but the persistence of some in all essential details is striking, as is the evidence that the general nature of the festival cycle has remained much the same since Alberūnī's time.

[65] Sachau, Edward C., ed., *Alberūnī's India* **2**: 177, London, Kegan Paul, Trench, Trubner, 1910.

[66] *Ibid.*, 182.

[67] *Ibid.*, 184. Alberūnī also gives an account of the Gobardhan legend, 175.

[68] Gode, P. K., Studies in the history of Hindu festivals — some notes on the history of Divālī Festival, *Annals of the Bhandarkar Oriental Research Institute* **26**: 216–262, Poona, 1946.

This cultural stability is all the more remarkable in the light of Rāmpur's geographical location. This is an area which has been a battleground throughout much of its past history. The legendary battles of the Mahābhārata were fought here, and through this territory came the invading Muslims who made Delhi their capital. Between 1760 and 1805, after the collapse of the Mughal empire, Sikhs and Mahrattas were engaged in a desperate and bloody conflict, until the superior power of the British was established. Ibbetson reports that at that time out of 221 villages in pargana Karnāl (close to Rāmpur) the inhabitants of 178 had been wholly driven from their homes and fields.[69] And for a long time thereafter the whole region was in a state of lawlessness and anarchy. The heavy exactions of revenue collectors led to a large-scale abandonment of villages and escape to Sikh territory.[70] Later uprisings at the time of the Mutiny of 1857 and the more recent upheavals of Independence and Partition have also affected the area. The past history of the general region, then, has been a turbulent one. It has also been the scene of conflict between different religions and political ideologies—of Hinduism, Islam, Sikhism, the Ārya Samāj movement, and of political groups such as those of the Congress Party, the Socialists, etc. But perhaps in most cases these movements affected the cities more than the villages. The cultural stability, at any rate, is noteworthy in villages like Rāmpur.

Nevertheless, some changes may be noted in the festival-cycle of present-day Rāmpur, particularly in the abandonment of former practices. Some festivals, such as Kāj, which were formerly observed at Rāmpur, have recently been dropped. There used to be regular ceremonies at a Muslim *Sayyad* shrine, but in 1947 the shrine was destroyed by members of the R.S.S. (Rastriya Swayam Sevak Sāngh), a Hindu extremist group, and the ceremonies are no longer held.

A variety of practices have lost currency in recent years, some of which may be itemized: Few lamps are now lit at Devī's shrine on Devī-kī Karahī; some lamps are lit at peoples' homes instead. There has been a falling-off in the number of pilgrims who go to Beri or Gurgāon to worship Devī or Mātā, and also in the number of men who go to bathe in the Jumna or Ganges, according to the villagers. Cocks are no longer held over children's heads at Bāsora. *Bhāgats* no longer perform in honor of Gūgā pīr. Butter is now made during Kanāgat by most families, although this was formerly taboo. Oxen are yoked by some families on the afternoon of Amāvas. A variety of factors are involved in these cases.

In another set of changes, however, we can discern a common element—the decline of the Brāhman's role at Rāmpur. A Brāhman is no longer called upon to fix the "foundation pole" of the Holī pyre. A Brāhman woman is not asked to tell the story of Hoi at Karvā Cauth, as she was in the past. This is usually done by one of the older women in the family. Local Brāhmans do not usually accept food-offerings at *srāddha* ceremonies or at Makar Sankrant, and they do not tie *ponchis* at Silono or present Niorthās at Niorthā-Dasahrā. The offerings at the Siva temple are accepted by a Gosain instead of a Brāhman; and only one Brāhman—from another village—accepts offerings at the shrine of Ghantal Deo or at the Holī pyre. The local Brāhmans are generally reluctant to accept offerings. There is also some reluctance to feed them—more, it is said, than in the past.

This is partly due to the influence of the Ārya Samāj. In 1910 the Ārya Samāj held a meeting in Rāmpur. Until this time Brāhmans had worn the sacred thread, but Jāṭs were now encouraged to wear sacred threads as well. Ārya Samāj speakers argued that it was a sin to feast Brāhmans, for the latter, induced by greed, were led to waste time which could otherwise be spent in constructive work. The village Brāhmans, they further claimed, could not read the Vedas and were thus only Brāhmans by birth but not by attainment. The Ārya Samāj and some of the leading political parties also campaigned against untouchability. Around 1925 a large meeting was held at Chori by the Ārya Samāj at which hundreds of Jāṭs and members of other castes drank water and ate *hālvā* distributed by untouchables. The second conference of the Ārya Samāj in Rāmpur, in 1933, was devoted to the same purpose. One of the villagers said that the speakers addressed the Camārs, telling them that *begār* (obligatory work without payment for officials) had no legal basis. The Camārs were encouraged to refuse such forced labor, and were told that if they got into any trouble as a result, the Ārya Samāj would come to their aid.

After this conference the Camārs at Rāmpur began to give up rendering *begār* service. The

[69] Ibbetson, *op. cit.*, 33.
[70] *Ibid.*, 48.

Jāṭs then began to cut down on the Camārs' shares of agricultural produce. This has contributed to the weakening of the *jajmānī* system at Rāmpur. The Jāṭs are reluctant to give gifts at festival times to the Bhaṇgīs, Camārs, and other low castes because of the failure of the lower castes—particularly the Camārs—to carry out some of their traditional services. At the same time, the lower castes are losing some of their sense of inferiority and dependence. Like the Brāhmans, they are reluctant to accept charity, especially since the quality of the charity has declined.

It is not only the Bhaṇgīs, Kumhārs, and Camārs whose roles in the festival cycle have been affected by these changes. Also involved are the Nāīs (barbers) and their wives, who no longer act as messengers at festival times. They do not carry gifts to the daughters of a family any more; instead a brother or nephew does so nowadays.

These are important social developments. But despite these significant changes, one is struck, after all, by the relative stability of village life. The festival cycle, at least, remains as important as ever in the lives of the people of Rāmpur, and its essential structure is unchanged. Reformist doctrines and male skepticism have not shaken the women's faith; and the extended-family women's groups are still active centers in the maintenance of festival traditions. While individual festivals may decline or disappear, the basic character of the festival cycle has remained remarkably stable at Rāmpur.

THE YUPA INDIANS IN WESTERN VENEZUELA

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With supplements by Georg Geipel, Oliver H. Duggins and Mildred Trotter

A TREATISE on "Indian Dwarfs in Venezuela" by Dr. Eduardo Fleury-Cuello in the fall of 1953 came somewhat as a surprise to many anthropologists. Those familiar with the history of anthropological research in South Amerca know that as far back as the first years after the discovery of the New World, it definitely had been reported that there were dwarfish Indians in northwestern South America, the region where the conquerors invaded the country. In the fall of 1530 a German officer by the name of Nicholas Federmann likewise collected detailed information of a similar kind during his exploration trip. In following years, rumors and stories about Indian dwarfs faded away completely.

Only recently, brief comments on the extraordinary short stature of the Indians in the Serranía de Valledupar have been advanced by a few explorers. This mountainous region forms a part of the political frontier between Venezuela and Columbia. Dr. Fleury, a competent anthropologist, published the first measurements of 37 males and 37 females in 1953, and correctly appraised that Indian group as true pygmy, since the average of the male stature falls below 150 cm. It must be remembered that anthropologists, following the suggestion of Emil Schmidt, have agreed to recognize as "pygmies" only such groups where the males do not exceed 150 cm. in body height. The term "pygmy" ever since in scientific anthropology denotes a certain stature category, but not a definite racial type.

The data as published in the above named paper by Dr. Fleury, had been collected by Professor Cruxent on the first exploratory journey of the SCNLS (Sociedad de Ciencias Naturales La Salle, Caracas) in the high regions of the Sierra de Perijá, 1947–1948. Pursuant to my correspondence with Dr. Fleury since the end of 1953, we agreed jointly to investigate those Indians and to share all the expenses of an exploration to serve solely the purpose mentioned. It is my pleasure publicly to express my gratitude to the American Philosophical Society, Philadelphia, as well as to the Catholic University of America in Washington, D. C., for their grants in aid of our planned anthropological investigation.

Somewhat later, in his letter of 31 December, 1953, Dr. Fleury surprised me with the statement that he had planned a personal expedition to the Indians of the Sierra de Perijá in January 1954, adding however that he still was planning to carry out our original arrangements for a common investigation of those Indians in June. This was superseded by Dr. Fleury's letter of April, 1954, with the definite decision that he had found it unfeasible to participate in the joint expedition. This communication came as a further surprise, since I had concentrated on a joint investigation to begin in just a few weeks. My preparations had advanced to a degree that no other choice remained for me but to fly from Washington by the end of May. After my arrival in Caracas, Dr. Fleury, true to his promises, aided and furthered me in every respect.

Having complied with the legal requirements at Caracas, my port of entrance, I traveled by way of Maracaibo, the capital of Venezuela, to the small town of Machiques, which is the last outpost before one reaches the Indian reservations. From then on I was the guest of the Spanish Capuchins, who devote themselves to the mental and religious education of the Indians of that reservation. My sincere thanks go likewise to them for their hospitality and the aid received from them during my sojourn there.

The real object of my exploratory efforts was to ascertain whether the natives of the Sierra de Perijá were pygmies in the modern anthropological sense and whether a systematic somatological investigation could be scientifically justified. The proper answer to this problem may be seen in the investigation data further on. Accordingly, my efforts were devoted to somatological and demographical observations. Since in January, 1954, Dr. Fleury, and previously the missionaries,

had ascended to the Sierra de Perijá, I readily learned that the Indians of the high mountains are difficult to reach; that they live in many small isolated groups at wide distances one from the other; that proceeding on narrow Indian paths through the wild waters and deep ravines is exceedingly bothersome and often quite dangerous; that in this altitude practically nothing grows in the way of food for an explorer and that, finally, most if not all adult Indians would refuse to be treated anthropologically by me only five months after Dr. Fleury's visit. He already had met with strong opposition from the natives before, though in exchange for sumptuous presents and food materials they submitted to his examination. I myself considered it superfluous and unfair at the same time, to reexamine those natives who, just a few months before had been carefully examined by the same methods which I would have employed. These considerations were responsible for my scaling the mountains along the Rio Tukuku, which likewise caused me to summon the grown-ups and some of the children from the higher levels to the mission station and other spots at the foothills. In this I was indeed more successful than by entering their rancherías as a single helpless outsider. However, a number of these people did not respond to my request, and naturally I could not have succeeded in my purpose had I visited them in their huts. Even at the missionary station, some of them turned their backs on me when I tried to examine them, but I was able at least to estimate their stature by visual contact. The number of Yupa Indians whom I met is, in every way, sufficient for the observations which are listed in this treatise. Even in Machiques itself I encountered a number of native men which in my estimation justifies my appraisal of the Indian groups in the region of the Rio Negro.

Through correspondence from Washington with the well-known Swedish explorer, Professor Bolinger, I learned shortly before my departure that for the last months of the same year of 1954, he was planning his third trip from the Columbian approach into the Serranía de Valledupar. It is by this approach that the Maraca Indians, who according to his previous observations are all of short stature, can be reached. I should like to have visited this tribe myself, but was not prepared for this difficult trip in Columbian territory. Furthermore, it seemed unfair to explore an area three months prior to Professor Bolinger in a territory which for a long time had been his chosen interest. It is hoped that the results of his anthropological research upon the Maraca may soon be published.

I consider it a duty of devoted friendship to add that Dr. Eduardo Fleury-Cuello, on returning from his arduous trip through the Sierra de Perijá in January, 1954, had suffered serious impairment of his health. While I was still in western Venezuela he went to South Germany for medical treatment in order to improve his weakened condition. He passed on, the 29th of October, 1954, during the return voyage to his homeland, just one day before the ship landed. According to information received by correspondence, his friends in Caracas intend as soon as possible to publish all the observations made by Dr. Fleury from his devout exploratory efforts in the Sierra de Perijá.

I. HISTORY OF THE INVESTIGATION

The northwestern corner of South America was explored at an early date, and the existence of dwarfish Indians in that region was definitely mentioned at the same time. For hardly had Columbus on his third voyage to the New World perceived this Continent on 1 August, 1498, than Amerigo Vespucci, together with Alonzo de Ojeda, sailed along that coast in 1499–1550, both reaching Cabo de la Vela upon the western shore of the Península de la Guajira. Rodrigo de Bastidas advanced as far as Bahía de Santa Marta in 1501. Somewhat later, in 1527, Juan de Ampies founded the small settlement of Santa Ana de Coro which, as the actual center of the civil administration of this little district still retains a certain importance at the eastern most corner of the Golfo de Venezuela.

The well-known and rich Welsers, founders of a widely extended German commercial kingdom, immediately realized the importance of establishing a central branch in the recently discovered part of the New World, whence the exploration of the hinterland was to be carried on. In Madrid, they obtained the necessary concessions from Emperor Charles V in 1528, then entering into a regular treaty with García de Lerma, the newly appointed Governor of Venezuela, they began laying their plans. In addition to this treaty, another one followed in the same year, which the Spanish Crown entered into with two Germans, Heinrich Ehinger and Hieronimus Sailer.

Immediately exploratory expeditions were undertaken into the interior of Venezuela, under various German commanders, amongst them being the very young Captain Nicolaus Federmann, Jr., who played an important role. His first advance into the entirely unknown South started from Coro with 100 Caquetíos Indians on September 12, 1530. The following years also saw him hard at work on the exploration of the new land. They, like other courageous adventurers somewhat later, were goaded by the lure of finding the legendary Lake Guatavita, in a region said to be teeming with gold. He left a detailed description of his expedition in his famous *Indianische Historia*, published in book form five years after his death in 1557 by his brother-in-law, Hans Kiffhaber.

Federmann, for the first time, and only a few decades after the discovery of America by Columbus, tells of pygmoid natives in the southern mountains not far from the Golfo de Maracaibo. When, on his reconoitering march, he had come to the last settlement of the Xideharas Indians on September 23, 1530, these natives informed him that "two days journey from here lived another nation, the Ayamanes, who were hostile to them, and that therefore this strip of land was uninhabited and bare. They likewise were of short stature, dwarfs, but warlike, and they lived in a crude and mountainous country" (p. 97).[1] This area of the Ayamanes is identical with the frontier between Estado Lara and Estado Falcón, and is traversed by the upper Rio Tocuyo. Continuing his trip, Federmann finally reached the village referred to where some of the inhabitants, led by their Chief, came out to receive him and his followers. "Although this cacique or chieftain was not as short as the dwarfs mentioned further on, there were a number of dwarfs with him, the tallest being three and three-quarter to four and one-half feet high" (p. 100). These Indians furthermore reported to our Captain "that four days journey from this place the land was inhabited by dwarfs, and by very short people some days farther on" (p. 101). Continuing his journey, Federmann came quite close to the people "whose small size, from hearsay, was astounding" (p. 103). But "since it was infeasible to travel through those mountains for an extensive period of time," he ordered one of his officers with fifty armed men to scale the heights and fetch those people down. They were successful in doing so only after a fierce struggle. "Returning late in the evening, they brought back about 150 persons, men and women whom they had trapped in a village and captured. These people were all very short, but unmixed, as I had been informed beforehand by the Indios. The tallest of them measured five spans and were of delicate proportions and appearance" (p. 104). Federmann finally relates that the cacique of these dwarfish people "gave me a woman dwarf of four spans of beautiful proportions and appearance whom, he said, was his wife. I accepted her as a present, although she behaved quite badly and cried violently. . . . I took this dwarf with me to Coro, where I left her, for I had not intended to estrange her from her native land since the Indios do not live long outside their accustomed environment, and in colder regions" (p. 105). This description, and indeed the whole of Federmann's book is so matter of fact and sincere, as he relates his story, that the author deserves fullest credence. His reports probably were responsible for the word "Pimeos" appearing somewhat southeasterly of the Golfo de Maracaibo, on a crude map published in 1535. The word "Pimeos" had been inserted, which apparently stands for "Pigmeos." Who the Ayamanes mentioned by Federmann were cannot be discussed here. Jahn (p. 335) counts them in the linguistic group of the Betoys. He uses the more precise spelling of their name: Ayomanes. Federmann's report on their pygmoid stature always met with doubt, and was finally forgotten.

In 1550 Alonso Pérez de Tolosa undertook an unsuccessful campaign, southwestward, against Indians widely distributed in the spacious regions between the Rio Zulia and the Rio César, which includes the Sierra de Perijá[2]. These natives have become known as "Motilones." All later reports describe these Indians as exceedingly dangerous and inapproachable for peaceful purposes. Even earlier, the first Spanish officer, Alonso de Ojeda, who with a small group of his followers had advanced too far into their realm, had been struck by a Motilones arrow.[3] In addition to their name "Motilones," they are designated as "los peores indios que hay" in a geographical map of Venezuela by D. Juan

[1] This quotation is from Arnold Federmann's *Deutsche Konquistadoren in Südamerika*, the original of which is written in illuminated late Gothic script.

[2] See Fray Simon, *Noticias historiales de la Conquista de tierra firme en las Indias Occidentales*, Cuenca, 1627.

[3] See the historical record in C. de Armellada, Los Motilones, *loc. cit.*, p. 12.

López (Madrid, 1787). And de Booy (p. 188) adds: ". . . which even in our day is the current opinion of the inhabitants of the neighboring regions." In the 18th century, Capuchins of Navarra began an intensive missionary activity in those western regions of present-day Venezuela; they also raised serious complaints about the untamed behavior of native Indians toward every European. Finally, the missionary activities had to be discontinued, and until the middle of the 19th century the Indians themselves withdrew into the fairly inaccessible fastnesses of the rugged Sierra de Perijá.[4] However, a better understanding of those Indians has grown up slowly, owing to progressive penetration into that vast zone.

The generalized name of "Motilones" applies to a number of small Indian tribes. More recently, the Whites and the Mulattoes of the peripheral areas between Venezuela and Colombia distinguished between "Motilones bravos" and "Motilones mansos" who live farther to the north. The former are unabating in their intransigent attitude toward any stranger. Even at the present time, frequent clashes are reported between them and the workmen of the petroleum companies who are intruding into their abodes.[5] Although the indication "Motilones bravos" by the Whites may appear justified to some extent, on the other hand there are the older rights of the Indians to be considered. Jahn (p. 81), even 30 years ago had correctly appraised the situation thus:

> Of course, the cause of all these bloody frictions must be seen in the abuses of the white tradesmen who work havoc with the poor toiling Indians, exploiting their ignorance and robbing their wives and daughters. It must also be laid to these abuses that the Pariríes Indians, who gave in to a certain extent, withdrew in 1875, to their forests and declared war to the death on all *Pañur*, i.e., Spaniards or Whites.

What Jahn says of the Pariríes group holds good for all other divisions of the Motilones.

A. Ernst (1887) was the first to integrate these natives into the Caribbean language group. In 1914–1915 the Swedish explorer, Gustaf Bolinder, mounted the Sierra de Perijá from eastern Colombia, and pointed out the linguistic or dialectic differences in these Indian groups. Four years later the American geographer, Th. de Booy, came to Machiques in the Estado de Zulia (western Venezuela) and ascended the slopes from the Apón Valley where he was able to distinguish the following groups, of which he writes:

> I might state here that the researches of this expedition proved that the Tukukus, the Irapeños, the Pariríes, the Macoas, the Rio Negro and the Rio Yasa Indians all belong to the great Motilone family (p. 186).

Only a few years later B. Tavera-Acosta (p. 217) and A. Jahn (p. 80) tried a more precise linguistic grouping. According to the latter, all these groups speak the same language, "namely, the Motilón, which likewise is used by the Indians on the Colombian side, and by those living to the south on the Rio de Oro and Rio de Catatumbo." He thus classifies all of them as "Motilones," but divides them into two main groups: (1) the Chaké, comprising the Makoa, Tukuku or Irape, Pariríes and Chaké, and (2) the Mapes, including the Motilones of Rio Catatumbo and Rio de Oro.[6] The subgroups of the Pariríes for their part, consist of the Yasa, Chaparro and Rio Negrinos, taking their names from the rivers on whose banks they live. The Tukuku or Irape follow to the southward, and to them belongs the valley of the Rio Tukuku. It will be seen that all the smaller tribes united in the Chaké group live in the high mountains because they prefer the cooler environment to the hot climate of the plains.[7]

In the meantime, the more correct designation of "yupa," meaning "man," has partly superseded that of "Chaké." These Yupa people now inhabit the Sierra de Perijá, and each one of their

[4] More detailed historical data on this wide expanse may be found in A. Ernst, 296 sq., 1887; A. Jahn, 25–117, 1927; M. Schön and P. Jam, 255–259, 1953; C. de Armellada, 1954; Bolinder, 245 sq., 1925.

[5] See Jahn, 102 sq., 1927; C. de Armellada, 55 sq., 1954.

[6] These Mapes are the true "Motilones bravos," and feared nowadays as "the most ferocious and least amenable to civilization . . . . They often carry out acts of revenge which are no less than surprise killings committed against those who venture into their domains in search of cabima, rubber, crude oil, or some other natural product" (Jahn, 82, 1927).

[7] A new linguistic grouping has been proposed by P. Rivet and C. de Armellada (1950), according to which the Mapa de las zonas antigua y actual, de los Motilones, of C. de Armellada, 74, 1954, is not entirely correct, because the groups living in the high mountains have been marked in this map outside the linguistic border. He likewise declared that the "Motilones bravos" are of the Chibcha, not of the Carib race (*ibid*, 82), relying thereby upon a word list compiled some time ago.

small divisions is named after the river in the valley in which they are settled. The unjustifiable grouping of the natives of western Venezuela into "Motilones mansos" in the mountains and "Motilones bravos" on the plains definitely should be discontinued.

Many an explorer, despite the risk of life, has ventured into those regions during the past decades. A. Jahn, between 1109 and 1922, undertook several short trips through the wide expanse between Rio Catatumbo and Rio Palmar; and in 1919 the American geographer, Th. de Booy, went up the Apón Valley from Machiques. After Gustaf Bolinder, on his first trip in 1914–1915, had visited that area from the Colombian side, he ascended the Sierra de Perijá once more in 1920, journeying southward from Valledupar through the high mountains. At the present time, he is traveling through this country for the third time. William H. Phelps, an ornithologist, in 1940 visited that Sierra to study the birds; he was accompanied by F. Yépez, an engineer, who afterward in 1945 provided a useful description of the Rio Negro Indians. In the same year Reichel-Dolmatoff published a comprehensive monograph containing his findings, from an investigation of the natives on the Colombian side of the Sierra de Perijá. Since 1938 Spanish capuchins have undertaken several expeditions through the western regions of Venezuela, intending at the same time to found a missionary center, a plan which they realized in 1945 in the establishment of the station Los Angeles del Tukuku.[8] Three expeditions carried on in that Sierra in 1947–1948, in 1949–1950, and again in 1950–1951, by the SCNLS (Sociedad de Ciencias Naturales La Salle) yielded rich anthropological results. As mentioned above, an expedition for somatological investigations had been in the planning since the fall of 1953 for the year 1954, to be taken jointly by Dr. Fleury-Cuello and myself. However, Dr. Fleury, accompanied by his assistant Dr. Emmer, owing to more favorable weather conditions, had already started out in January, 1954, which forced me to carry on the planned investigations alone in June of the same year. Gustaf Bolinder also had returned to the Sierra de Perijá in October, 1954, with the intention of completing his previous investigations.

These scientific investigations have yielded a considerable amount of data, all of which help to afford a comprehensive picture of the life and customs of the Indians in those mountain regions.[9] However, what heretofore had been lacking was a reliable description of their somatological properties. The two explorers, Bolinder and Th. de Booy, were indeed the first, after the time of Federmann, to have again drawn attention to the dwarfish Indians of the Sierra de Perijá. Recently, more precise data have been published on this subject by Cruxent and Fleury-Cuello. My own detailed investigations of June, 1954, follow below.

II. REGION AND CULTURE

It is a well-known fact that environment and economy are closely related, and in fact are interdependent, influencing likewise the body form of its native population. The physical character of the Yupa Indians can fully be understood only by studying their habitat and living conditions. Of course, there is ample proof that the groups which now occupy the high mountainous regions were formerly settled in the lowlands. But this comparatively short span for the life of a people was sufficient to cause and to develop certain modifications in their physical type, and these physical changes and adaptations are all the more outstanding the higher the mountain dwellers ascended above the settlers of the lowlands.

The Sierra de Perijá lies in the tropical belt between 9° to 11° north latitude, and between

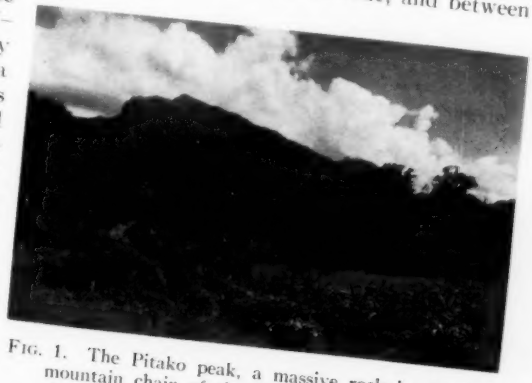

FIG. 1. The Pitako peak, a massive rock in the long mountain chain of the Sierra de Perijá, dominates the habitat of the Yupa Indians.

[8] C. de Armellada, 45.

[9] See Alfred Métraux and Paul Kirchhoff, The northeastern extension of Andean culture, in Julian H. Steward, *Handbook of South American Indians* **4**: 349–368, Washington, D. C., 1948.

72°40′ and 73°30′ west longitude. The political frontier between Venezuela and Colombia runs over its highest peaks, and furthermore, this coincides with the divide of the rivers which in the east flow toward the Lago de Maracaibo, and in the west toward the Rio César, which itself empties into the Rio Magdalena. The southern section of this mountain range is called Serranía de los Motilones, the northern the Serranía de Valledupar, in which latter are settled the Yupa Indians. The ascent of these mountains is extraordinarily steep. The highest elevations, the Manatará (3,630 m.) and the still higher Pico Tetarí (3,750 m.) rise near the headwaters of the Rio Negro. The Pico Tetarí occupies the same latitude as Machiques, the capital of the State of Zulia.

Peculiar to these steeply-rising mountains are the deeply-cut valleys, in which, after almost every rainfall turbulent waters collect and break forth with thunderous might. This explains the phenomenon of the numerous easterly-directed water currents running at short distances between themselves, each of them engulfed between high and steep rocky walls, where each has eaten its irregular course deeply into the hard granite. Several of the smaller rivers (Rio Motilones, Macoa, Macoita, etc.) combine to form the Rio Apón, while others (Rio Yasa, Tukuku, Santa Rosa) join to form the Rio Negro. Between these two larger streams runs the smaller Riocito. None of them ever becomes completely dry since rain falls throughout the year, although varying in quantity. The heavier falls cause the rapid increase of the flood, which with tremendous force races downhill, carrying stones and gravel in its wake.

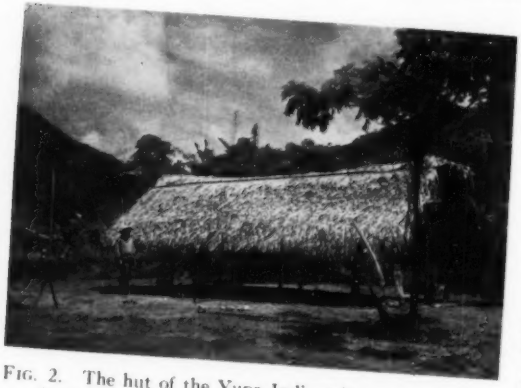

FIG. 2. The hut of the Yupa Indians is no more than a large gabled roof supported by several poles. As walls are lacking, the air circulates freely.

In these steeply-rising mountains three different thermic zones can easily be distinguished. At the highest elevation the nights are always cold. Dense woods climb up to considerable heights, where for hours both day and night, all is enveloped in heavy fog with everything dripping in heavy moisture. Naturally, this dark and wet forest becomes cooler with increasing altitude, and brings forth only a nominal amount of fruit and vegetables, insufficient to sustain higher forms of life. The entire Sierra de Perijá therefore lacks animal life to an extraordinary degree, so that settlers in those regions cannot survive on the proceeds from hunting alone.[10] Glades and weather-beaten spaces, the so-called sabanas, are seen in spots enclosed by dense forests. Limited agriculture, despite the low temperature throughout the year, and the elevation of 600–1,400 m. above sea level, is possible in the areas inhabited by the Indians, but the crops under such conditions are consequently quite meagre. Our Indians are fully resigned to this, for to offset it, they enjoy the advantages of being almost beyond reach of the Whites, and far distant from other Indian groups.[11]

These brief observations show the absolute insufficiency of what the Sierra de Valledupar has to offer its inhabitants. True it is, therefore, that only a small contingent of the Yupa Indians can eke out a frugal existence in this wide area, and they have to rely predominantly upon vegetal produce. In a few open spaces of limited extension, the Indians raise maize, bananas, pumpkins, papaya, etc., in a very primitive way, but cannot expect even a nominal harvest under such circumstances. Almost daily their occupation consists of seeking food in the woods for their sustenance. Of course, their success in gathering what nature offers them voluntarily is dependent upon all kinds of circumstances and influences, and consequently results in quite meagre returns.

The care in preparing their vegetal food is almost nil with these Indians. The same is true

[10] Th. de Booy, 402, emphatically relates how poor that whole region is of game, as he and his porters driven by hunger were forced to return to the plains sooner than had been planned.

[11] Geographically detailed accounts are given by Wilhelm Siever, Die Sierra Nevada de Santa Marta und die Sierra de Perijá, *Ztschr. d. Ges. Erdkunde* **23**: 1–158, Berlin, 1888. Furthermore, Th. de Booy, An exploration of the Sierra de Perijá, *Geogr. Rev.* **4**: 385–410, 1918.

with regard to smaller animals such as lizards and snakes, caterpillars and worms, young birds and underfed monkeys, all of which are roasted superficially in hot ashes and eaten half raw.

Under such conditions, the tragic fact remains that these Indians spend their whole lives in a state of undernourishment. Occasionally, harvested maize is used for the production of "chica" which seems to be indispensible to them, and they do not end their drinking bouts until all the "booze" is gone. Wherever an opportunity for such feasting offers itself, the Indian is on hand! Women and children likewise indulge without restraint. Eating, as well as bodily protection for infants and children is neglected, and for hours the inebriated people lie about, mercilessly exposed to downpours of rain, to the cold of night and the icy winds. Drinking bouts usually end in quarrels and bodily harm, during which many individuals suffer serious injuries, or even death. Frequently, a drunken husband vents his rage upon his defenseless spouse, cruelly mistreating her. He then throws her out of his hut and takes in another woman. It often occurs during these chicha-drinking feasts that the women and girls are pitilessly beaten and brutalized, and in their helplessness have to submit to be handed on from one drunkard to another. The social structure of these Indians has become completely disintegrated during the past decades, and there is no one with authoritative power to prevent these abuses.

The housing conditions of the Yupa, likewise, are simply wretched, living as they do under makeshift roofs constructed of layers of loosely-bound leaves, supported by poles four to six feet high. The effort of building solid and weather-proof huts seems beyond their ambition. Peculiarly enough, they do not even know the hammock. A light shirtlike garment made of wild cotton serves as a body cover for all alike. Some Yupa men, for the past thirty years, occasionally leave their mountain resorts for visits in the valleys where they meet Whites and Mulattoes, and on such occasions they buy trousers which they continue to wear until they fall off in rags. The individual groups of the Serranía de Valledupar coincide closely in regard to their material culture with what Th. de Booy had already stated when he wrote: "From what I could gather from the Tucucus, the Irapeñas, Pariris-Tucucus, Rio Negro and Rio Yasa Indians have practically the same customs as the Macoas, and use the same inventions" (p. 198).[12]

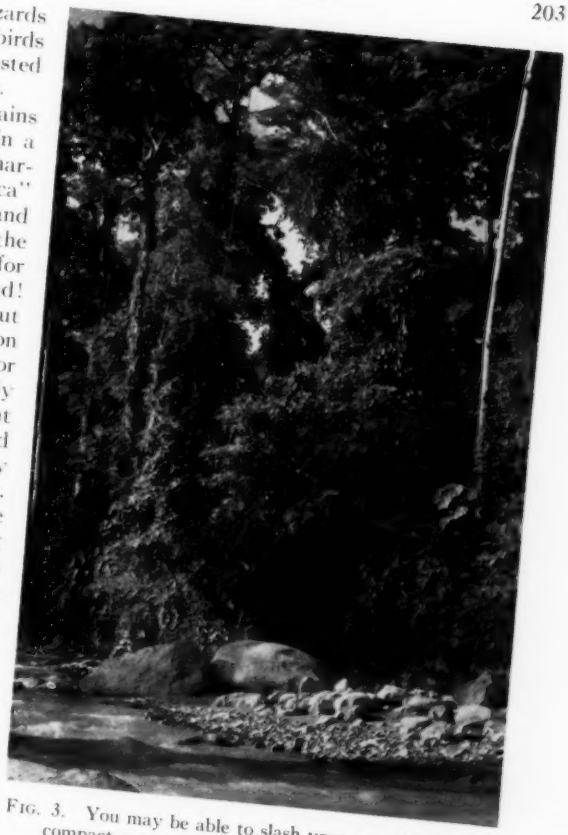

FIG. 3. You may be able to slash your way through the compact mass of herbs and bushes, lianas and parasitic creepers, only with the help of a sharp *machete*.

These brief notes demonstrate the fact that the living possibilities of the Yupa people, who inhabit a rather unproductive area, are altogether quite miserable. In addition, these natives are today, and have been for generations, degenerated to such an extent that their existence grows progressively worse, owing to their personal habits. Hunger and malnutrition, brutalities and bitter resentment conspicuously manifest themselves in these helpless creatures in the physical types of the children, and still more so in those of the adults.

[12] Detailed descriptions of culture and living habits of the Yupa Indians may be found in the contributions of Th. de Booy, Alberto F. Yepes, G. Reichel-Dolmatoff, Julian H. Steward, M. Schön y J. M. Cruxent, *et al.*

III. PHYSICAL APPEARANCE

"Stockily built, with short cut hair, high cheekbones, and somewhat unclean in their personal habits, the Macoas are not attractive to look at" (de Booy, 198). This comment can be applied to all the people who live in the Serranía de Valledupar. The racial type of the true Indian, however, stands out unquestionably from this broad aspect, even though certain physical features appear less definitely marked. The peculiarities of their Mongolian descent are more precisely distinguished in the female as compared with the male. Beyond this, there is in point of race a close relationship between the Yupa and the other Indian groups in northern South America, which not only holds true for the low stature, but likewise for the head and face formation.

In the following investigation particular emphasis is laid on the stature of our Yupa, besides a number of absolute and relative measurements representative, so to speak, of the racial picture in its totality, and similar to the methodical procedures of a painter in reconstructing the human figure.

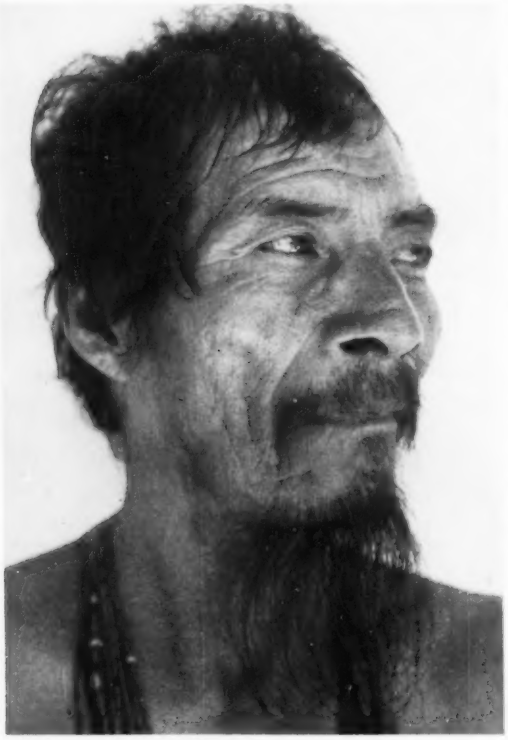

FIG. 4. As these Indians belong to the large Mongoloid racial stem, the hair develops very little, it is scanty on their body and face.

The measurements applied here are those of Martin's *Lehrbuch der Anthropologie* (1928), from which his numbers are added to the present measurements.

1. THE BODY FORM IN TOTO

The fact that only 23 males and 14 females could be examined is of course a slight disadvantage. All of them were adults, the men above 25, the women above 23 years of age, a statement necessary for the proper evaluation of the findings offered, the more so since two missionaries who personally knew most of the Indians there, have informed me that Dr. Fleury, in January, 1954, appraising many an immature individual as grown up, has recorded their body measurements as those of adults.

The Yupa people under investigation are a mixture of two conspicuously different racial varieties, the outstanding racial features of both being quite manifest. The lesser group in general is equivalent to the Caribs of the wide expanses of the middle and lower Orinoco River. They are of medium stature, and have a long oval face with high forehead and a narrow high-bridged nose. It is quite impossible to unravel their racial descent, and nothing is gained by linking them to the Arawaks, since the latter are of almost the same stature as the Caribs. The majority of the Yupa resemble in decisive features of body and head all the neighboring tribes of the whole Valledupar mountain range, including those groups which live on the Colombian side. They are short, stocky, and broad-shouldered, the head is of medium size, the face predominantly roundish, and the nose small and low. Whether this variety represents the true Carib type cannot be verified since frequent miscegenation has been occurring for centuries throughout the entire northwestern section of South America.

It has been the main object of my trip into Sierra de Perijá in June, 1954, to find out whether the natives there might be designated "Pygmies," a term anthropologically indicating a category of size, as mentioned above. Earlier explorers have not recorded exact measurements, but simply described the Indians of the Serranía de

Valledupar as "short," "pygmy," or "pygmoid." It is of interest, however, that a number of observers distinguish between two groups definitely different in stature, of which one is called medium tall, the other short to very short. Federmann already had pointed out a district south of Coro as inhabited by "dwarfs or very small folk." According to him, the entire "Ayamanes nation" consists of "dwarfs" settled in the mountains. Among them are seen individuals of conspicuously low stature, with otherwise normal mental and physical status. To Federmann, this fact too was known, for he received as a present "a female dwarf about four spans long,[13] of beautiful proportion and appearance" (p. 105).

No less decisive are the utterances of more recent observers, namely, that there are Indian groups of medium and of very low stature nearby in the Serranía de Valledupar. Bollinder (*a*): 222, made the following observations on his first two trips:

> The Motilones Indians are well developed, slender and of light complexion. . . . They refuse to be measured. The men have a stature of 160–165 cm., the women are shorter, but well proportioned . . .. In Maraca, the Indians were frequently found to be very short, measuring hardly 140 cm. at times, but it cannot be claimed that they are dwarfs since some individuals measured from 155–160 cm. However, there were so many short ones that the rumor of a dwarfish people may be justified to a certain extent.

In a footnote he further states: "The shortest Maraca Indians measured by me were a man of 142 cm., a woman of 138 cm., and another woman of 135 cm." (p. 258).

In his book about his third journey (1936–1937), Bolinder (*b*) publishes some pictures of Maraca Indians, repeating once more: "They were altogether quite short, almost dwarflike, men about 140 cm., women less" (p. 51). In his letter to me dated March 16, 1954, he wrote of these Indians as follows: "Only the Maraca Indians are pygmoid," while the Rio Tucucu and Rio Negro Indians he considers as of "normal size."

Th. de Booy (*b*): 194 and (*a*): 395, explained: "that the average height of the Macoa men is five feet one inch, while the average height of the women is four feet eight inches," but does not say of how many persons these are the averages.

Of the same general kind are the brief statements of Albert Fernandez Yepes, when he writes: "The Rio Negro Indians are of low stature, they measure approximately 1.55–1.65 m. . . . The small size of these natives makes them appear at first sight as being weak, while in reality they are quite strong and resistant" (p. 67).

These Indians were described as "greatly reduced in stature, microcephalic, dolichocephalic and leptorrhinic" by Requena, pursuant to his lecture on "Craniometría Ayamán."

Reichel-Dolmatoff has given a lengthy discourse on "Indios Motilones" and begins the description of their "Aspecto físico" in this way: "The Motilones can be called a people of pygmies. Indeed, their medium stature reaches hardly 1.35 m., with exceptions up to 1.40–1.45 m.";

FIG. 5. As in all Mongoloids, the zygomatic region of the middle face stands out distinctly in both sexes. A true Mongolian fold in the eyes seems to be absent in all Yupa Indians.

[13] "Span," an obsolete measurement: the distance between the end of the thumb to the end of the little finger when extended; in English measure, 9 inches (22.86 cm.)

FIG. 6. The first European explorers who found their way through the mountainous region of what today is the southern section of the Venezuelian Republic, had been informed about a large number of very small individuals among the aborigines.

Bolinder (*b*): 51, states "1.40 m. as the medium stature for men on the eastern slope . . ." (p. 20). These findings do not indicate whether the figures 1.35 m., and 1.40–1.45 m. result from exact measurements, and how many persons were measured. It also would be incorrect to assume that the finding of "1.40 m. as the medium stature of the men," as quoted by Reichel after Bolinder, had been derived from a certain number of individual measurements. All these reports indicate that only the very small individuals of this group were considered.

Wavrin, who is quite superficial in his statements throughout his entire book, describes the Motilones as "pigmées" and also as "pygmoïdes," without properly defining these two concepts. In his fig. VIII, the Indians are described as very short in comparison with his own stature. A similar impression is conveyed in table 87, picturing Bolinder (*a*) together with Maraca people.

Following the chronological order, the findings of the SCNLS may be recorded next. They cover three expeditions, and the anthropological observations of the first one made by Professor Curxent were studied and published by Dr. Fleury (*b*) in 1953.

The results regarding stature are assembled in table 1:

TABLE 1

STATURE (IN CM.)

Locality	Sex and number	Average	Range
Ayapa	♂, 11	152.5	145–158
	♀, 15	144.7	135–155
Shirapa	♂, 11	139.2	126–152
	♀, 12	132.8	122–140
Irapa	♂, 14	147.1	138–156
	♀, 8	138.0	131–145
Mipiripia	♂, 1	148.0	—
	♀, 2	125.0	122–128
Total	♂, 37	146.2	126–158
	♀, 37	138.1	122–155

Although these measurements were secured from only a small number of natives, the male average stature of below 150 cm. was decisive for classifying this group as "Pygmies." Further details may be looked for in Fleury (*b*): 262. It may be mentioned that I too have examined a number of Irapa men, as to stature, among them the old Marente (164.6 cm.), his elder son Máximo (174.7 cm.), his younger son Nemesio (156.8 cm.), and finally his daughter Pichisi (154.4 cm.). The measurements of these four extraordinarily tall persons are missing in Fleury's listing.

In addition, I would point out the following inaccuracy: According to Schön (p. 252), Cruxent saw in Alto Irapa a woman of only 128 cm. in body height. Fleury (*b*), who has studied and published Cruxent's measurements, does not make mention of it in his list (p. 263) of eight Irapa women.

Schön, however, makes this noteworthy remark: "In Alto Irapa likewise have been observed other Indians whose altogether short stature makes them appear as pygmoids," which expresses quite distinctly that those few indivi-

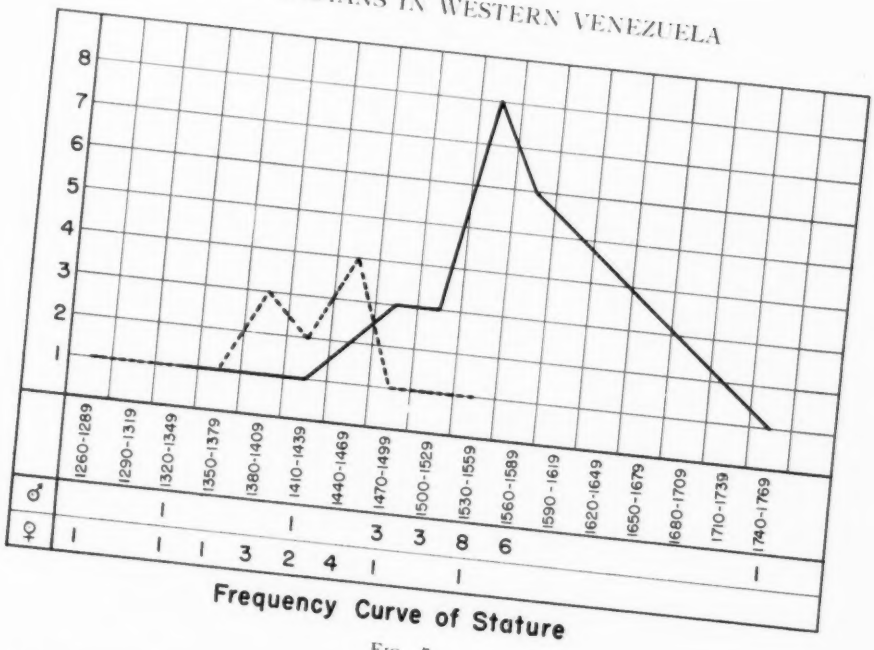

FIG. 7

duals form an exception in the group of short and medium high adults.

The same Schön who, as an anthropologist, participated in the second expedition of the SCNLS, has published altogether the measurements of only 13 adults of the Ranchería Ayajpaina; he found "a stature average of 155 cm. in men, and of 142 cm. in women." Nothing in his description indicates that he had been able to examine members of other groups in that region. From this, my personal experience seems to be corroborated that the region in question is quite sparsely settled, and that each of the rancherías is inhabited by only a few persons, and finally that the rancherías lie at some distance one from the other.

These findings on the stature of the Indians in the Serranía de Valledupar represent all that so far has been published in this respect, and I am now recording the results of my own investigations in the Rio Negro area, as carried on in June, 1954. I too have met the same difficulties of which previous explorers have complained, namely, that many Indians refused to be measured. The racial features of these natives, therefore, I have been able to demonstrate only in the case of 23 men and 14 women.

My lists contain individuals from the entire Rio Negro region, whom I have not separated according to their special habitats since they all belong to the same Yupa people.

The average stature of 23 men amounts to 1,537.7 mm., ranging between 1,337–1,747 mm., at the considerable difference of 410 mm. Only 5 individuals of the total fall below 150.00 cm., while two men even exceed 160.0 cm. The average of 14 women is 1,417.8 mm., at a range of from 1,288–1,544 mm., at the likewise notable difference of 256 mm. Of these women, 8 remain below 144.0 cm., while 1 exceeds 150.0 cm. From all accounts, therefore, this group cannot be designated "pygmies."

Up to the time of my exploratory trip, the adult male measurements of only four native groups were known, which, including my own, are comprised in the following table 2:

TABLE 2

MALE STATURE (IN CM.) OF YUPA GROUPS

Locality	Number	Average	Author
Ayapa	11	152.5	Fleury (*b*)
Shirapa	11	139.2	Fleury (*b*)
Irapa	14	147.1	Fleury (*b*)
Ayajpaina	7, (?)	155.0	Schön
Rio Negro	23	153.7	Gusinde

Only two of these five groups show averages below 150 cm. in a total of 25 men, while the three remaining groups, comprising 41 men, exceed this limit

Comparatively, it may be added here that my investigations upon 510 male and 382 female Banbuti pygmies yielded averages of 1,440.3 mm. and 1,370.4 mm., respectively, and that these eastern Twides about the Rio Ituri east of the Congo Belge possess the lowest stature of any human race on record, past or present.[14]

Comparing our averages, Fleury's (*b*) of 1,462 mm. for 37 men, and of 1,381 mm. for 37 women, with mine of 1,537.7 mm. for 23 men, and of 1,417.8 mm. for 14 women, the differences between our male and female averages amount to 75.7 mm. in the former, and 36.8 mm. in the latter. How can these relatively high figures be explained since the same population is concerned?

Admitting that in both cases the number of persons examined is small, an insignificant difference might have been expected. The surmise arises that for these measurements in Fleury's article only the shorter individuals were chosen, while the taller ones were passed by. Such a procedure I can prove for the people of Irapa. The 65-year-old Marente comes from true Indian stock and, in compliance with my invitation, he came down into the valley for the first time in June, 1954. He and his three tall children have no mention in Fleury's (*b*) records, as I have stated above. Marente belongs in the Irapa group, with a better right to be so classified than many another individual.

There is the probability, furthermore, that many an adolescent who had not yet attained his or her full stature, was measured by the explorers together with the mature ones. Procedures like these, I have already referred to in specific cases.

Finally, mention must be made of the peculiar composition of the rancherías. Thus, while in one ranchería may be found four or five adults, in others there may be more, and in varying numbers. Since all the Indians of northwestern South America are of low stature, it happens that in one ranchería the male average is below 150 cm., while in another it may exceed that figure, an inconsistency which can be deduced from Fleury's (*b*: 263) record. Naturally, of decisive importance will be the average which pertains to the Rio Negro Indians, i.e., the Yupa people as a complete ethnic unit, an investigatory proof not yet attained, for a systematic investigation of the rancherías is an exceedingly tedious and even dangerous undertaking; apart from the fact that many Indians refuse to be measured. But even if such an average for all the Rio Negro natives should fall below 150 cm. it will be of only a limited significance, since I am inclined to consider this low average but a modification, and not a racial trait.

The findings of other observers indicate that the body height of the Maraca Indians, west of the Serranía is uniformly low, and that therefore they may more justifiably be appraised as "pygmies," which however raises the question as to whether the low body height of the Maraca—and perhaps of the Yupa people—is racially conditioned. In answering this question, it must be pointed out that reports are uniform in that the "dwarf Indians" live in the high mountains.[15] Frequently one may read that among them are very small individuals such as are not encountered in the open plains. Could it be possible that living in the high mountain retreats still further reduces the stature of the Yupa people?

Only brief historical and physiological arguments can be considered here. The Yupa themselves relate that several generations ago they had inhabited the open plains at the foot of the mountains. Upon this fertile soil from which they reaped rich returns, they devoted themselves to agriculture, as well as to hunting, which provided ample sustenance. Threats and armed aggressions of other native groups, the Yupa were able to meet victoriously for a long time. Of late, however, Mulattoes and half-civilized Indians in increasing numbers, had gradually intruded into the regions then occupied by the Yupa, and finally have driven them out. Many Yupas perished in the wars between these two groups, while those who fled into the high mountains have since enjoyed the safety of this existence, but have had to pay for this advantage by foregoing better living conditions.

How poor the Sierra de Perijá is in nutrient

[14] See Martin Gusinde, Urwaldmenschen am Ituri. Anthropo-biologische Forschungsergebnisse bei Pygmäen und Negern im östl. Belgisch-Kongo, Wien, 1948.

[15] This is not the place to discuss whether the low stature of these Indians in the high mountains correspond to Bergmann's rule. See Marshall T. Newman, The Application of Ecological Rules to the Racial Anthropology of the Aboriginal New World, *Amer. Anthropologist*, **55**: 311–327, 1953.

material has already been referred to. Year after year periods of severe hunger have been followed by periods of even more serious food shortage, aggravating these natives to indulge in alcoholic orgies. For at all times past and present they have been addicted to alcoholism. Any occasion is reason enough for the preparation of chicha, and the natives congregate from all directions for these orgies. They become completely intoxicated for days, and the constitutions of the adults suffer severe injury because of their irregular feeding at these times. The much more sensitive children and infants suffer far greater harm when, hungry and alcoholized and without the necessary protection from cold and humidity, they lie for days uncared for. Throughout the whole year these Indians live in miserable dwellings and without sufficient clothing. After almost daily and frequently very exhausting trips to hunt for food, the comfort and rest with a warming fire during the prevailingly cold nights is impossible because of the lack of firewood.

These and other unfavorable influences, the most outstanding of which is the continuous undernourishment in connection with an entirely irregular life, have inevitably resulted in a general debilitation of these people. A slight decline which has affected the stature, has likewise resulted in a lasting modification, not however as a true mutation consequent to gene alteration or deterioration. The noticeably short stature of certain individuals, furthermore, may have been caused by specially unfavorable influences during their embryonic life or early infancy.

Presuming all this, one need proceed only a little farther in order to explain the phenomenon, namely, that pathologically deteriorated or deformed individuals are seen more frequently among the Yupa people than in other primitive units.

In short, difficult living conditions in the Sierra de Perijá have brought about a slight constitutional debilitation which may be rated as a modification. At the same time, a keen natural selection has worked efficiently.[16] This in particular is responsible for the fact that among the Yupa only a very few individuals live beyond fifty-five years, and that aged people are entirely lacking.

Here the identical biological process which F. Speiser witnessed among the natives of the New Hebrides repeats itself for having lived first at sea level and later on in the mountains, they acquired there a reduced stature in succeeding generations. Some of the latter returned to the coast where their descendants soon regained the typical stature of their kin who had never left the low regions, apparently proving that the genotypical construct of those who had lived in the mountains for a period of time and then migrated back to the lower level had not suffered any impairment.[17] This same phenomenon should hold true for the Yupa people, but for such observations, unfortunately, the necessary findings are wanting. It is impossible at this time to establish the stature of these Indians before coming from the plains, before they permanently settled in the mountains.

For quite some time, it has become impossible also to determine the precise paternity of many of the children. At present, the social conditions of the Yupa are in complete dissolution, because the majority of the men change their wives even in younger years and, when intoxicated, often cohabit with other women at such times. Although in this respect no definite proof can be obtained, nevertheless, it is generally established that extremely poor living conditions of long standing, have resulted in a slight degeneration of body form with a slight diminution of stature, a process which had its consequences in the Yupa Indians, too. So one deals here with "modifications" only.[18]

The Yupa people in their entirety, but divided into a number of small groups, inhabit the high regions of the Sierra de Perijá. In most of these small groups, as well as in those of the Serranía de Valledupar, are to be found individuals of considerable body height. The extent to which this feature may be attributed to their miserable living conditions cannot be verified, because of a lack of evidence as to the racial variants to which these taller individuals belonged.

[16] This view is also that of Reichel-Dolmatoff who writes (p. 20): "The short stature of the Yuko may just as well be a selective phenomenon. In many cases malnutrition can be observed among the Yuko as reflected by general debilitation."

[17] See Felix Speiser, Anthropologische Messungen aus Espíritu Santo, Verh. Naturf. Ges. Basel, 1946. Die Pymäenfrage, Experientia, vol. II/8. Basel, 1946.

[18] See Baur-Fischer-Lenz, *Menschliche Erblehre* 1: 587, Munich, 1936. Carleton S. Coon, Climate and Race, *Smithsonian Rep.* for 1953: 277–298, Washington, D. C., 1954.

2. TRUNK AND EXTREMITIES

The Indian type inhabiting northern South America appears distinctly personified in the bodily appearance of the Yupa. In corroboration, the frequency curve of stature ranges between 1530 and 1559 in men, and between 1440 and 1469 in women. Besides a few tall individuals, our Indians impress one as of a rather weak body structure. The trunk is moderately broad and rectangular, and thickset at times in women, since their legs are short in proportion. The taller individuals of both sexes are comparable to the slender Indian varieties of the North American prairies, and their carriage reveals a certain dignity.

Stature, as a complex measurement, is composed of several units, of which the trunk length is one. The absolute stem length as a projective measurement (23*a*), yields averages of 761.5 mm. in men, and 700.8 mm. in women. The trunk length (27 = measurements 4–6) amounts to 478.4 mm. and 440.2 mm. on the average in the two sexes. This measurement signifies a trunk more than medium long in proportion to stature.

The trunk height, furthermore, is dependent upon the variable position of the acromion and suprasternale points. For the latter the average falls at 1,254.8 mm. and 1,155.2 mm., while for the former it amounts to 1,272.6 mm. and 1,165.9 mm. for men and women, respectively. The acromion, according to these figures of the two sexes, lies several millimeters above the suprasternale. The considerable breadth between the two acromia emphasizes the quadrangular shape of the trunk, which is predominantly flat in the anterior aspect. The chest in particular shows little plastic differentiation owing to the weakly developed musculature, and the abdominal region has no special fat deposits because of the constant undernourishment of the Yupa people. In young females the breasts are of conical shape, but attain a short flattened appearance in multiparous women.

Their backs, too, are flat to the full extent, only women show a slight incurvation in the hip region, and their buttocks are somewhat fuller as compared with the men. Altogether, the backs in both male and female manifest no distinctive features.

This lack of distinctiveness is also true of the upper extremities, where only in individual males are the muscles of the arm somewhat better developed. The total arm length comes to the averages of 672.8mm. in men and 599.5 mm. in women, the sex difference of 73.3 mm. appearing quite considerable. The hands in both sexes are large, bony, and hard, the fingers thick and clumsy.

The legs are thin and sinewy in both sexes, but become considerably thicker from the knees upward in some middle-aged women. The total length of the lower extremity (measurement 13 minus 40 mm.) yields averages of 810.2 mm. in men, and 747.2 mm. in women, the sex difference being 63.0 mm. Slight bowleggedness obtains in the males, but no knock-kneedness in the females. The feet are medium long in both sexes, with a fanlike spread in the toe region. All toes appear thick, especially the first, which is the longest three-quarters of the time, and frequently it is somewhat diverged from the second toe. The soles, covered by more or less deep cracks, are universally flat, and for that reason completely cover the ground. The toe nails show signs of constant wearing off. These Indians always walk on bare feet, and the big toe is used in various kinds of handiwork. In standing, walking, and running, the longitudinal axis of the feet are turned inward, i.e., toward the body axis, which results in greater stability. The arm span as a complex measurement of limited importance exceeds the body height in the sexes, the average differences amounting to 58.0 mm. in men, and 31.8 mm. in women.

In addition, the correct evaluation by Schön (p. 254) of the physical appearance and capacity of the Yupa, may be repeated: "The bodily development of these Indians is in proportion to their stature: they are slender, with a lengthy trunk and short extremities. Men show a better physical development than do women, particularly the older females with their somewhat deformed bodies due to excessive work and numerous childbirths from an early age."

3. HEAD AND FACE

Neither head nor face shows any noteworthy digression from the Indian type in general. The size of the head, small to medium, is in harmonious proportion to the height of the individual, as evidenced by absolute measurements. The horizontal contour of the head, almost without exception, is broad-oval in men, and round-oval in women. The forehead rises steeply in most cases, is flat and rarely bulged. The arcūs superciliares do not noticeably protrude. In

some men, a slight ridge might be observed in the sagittal curve of the head near the hair line. The sagittal curve describes an altogether quite low vaulting of the top of the head, including the occiput which never protrudes. The maximum head length and breadth yield averages of 181.1 mm. and 143.1 mm. in men, and 172.4 mm. and 138.4 mm. in women, showing normally lower measurements in the latter. The cephalic L–Br index, in illustration of the rounder female head, gives rise to an average of 79.01 in men, and of 80.30 in women, both indicating mesocephaly, but very close to brachycephaly, a feature characteristic of the Indians in northern South America.

The face, on the whole, is more or less flat, but in tall persons the nose projects considerably which renders their facial contour narrow-oval, while in the majority of the people it is longish-oval to roundish by contrast. Considerable

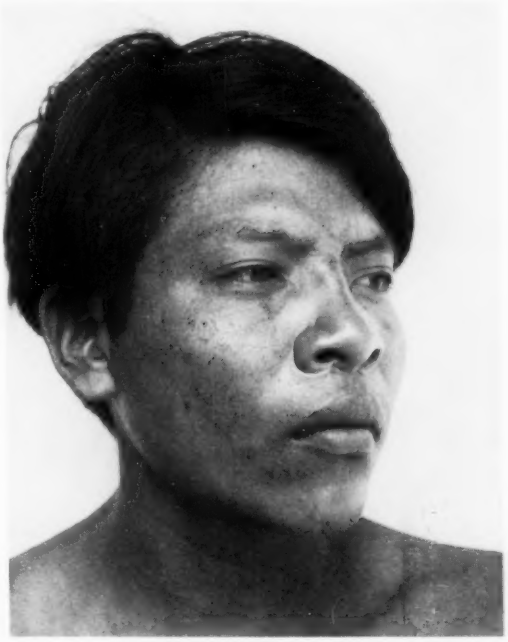

FIG. 9. The other racial variety belongs to the small human races. The face is of medium length and medium breadth.

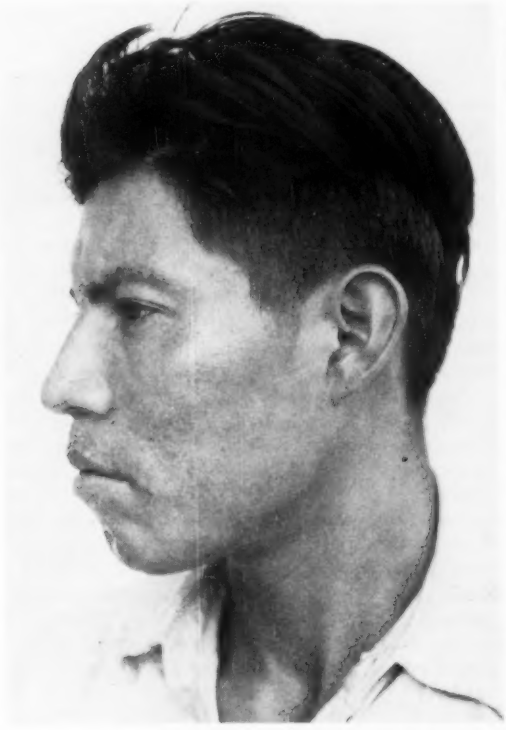

FIG. 8. As to their racial type, the Yupa Indians manifest two main somatologic varieties. One type has a tall body and an oblong face.

variation therefore obtains in the height measurements of the face which, for the physiognomic facial height averages 169.6 mm. in men, and 154.8 mm. in women, while for the anatomically more important morphological facial height the figures fall at 119.1 mm. and at 108.2 mm., respectively, in the two sexes.

The middle face is moderately high and appears to be flatter in women as against men, but the zygomatic region stands out distinctly in both sexes, and considerably exceeds the bigonial width of the lower jaw. The cheeks are well rounded and smooth in the early years, the chin is flatly rounded in most cases.

The soft parts around the eyes show the typical peculiarities obtained in all Indians of the tropical regions: there are no protruding arcūs superciliares. Moderately heavy eyebrows occur in individual men only. In both eyes, the axis of orbital width distinctly declines toward the median plane owing to the narrowness of the lid-slit (rima palpebralis) and the but scantily filled integumentary fold of the upper lid, a condition which superficial observers have mistaken for

FIG. 10. Some individuals show facial properties characteristic to the well-known Mexican Indians.

Mongoloid traits. A true Mongolian fold, however, not an Indian fold as distinguished by me in the Tierra del Fuego Indians, has not come to my attention. Neither have I seen in aged persons the integumentary portion hanging curtainlike over the lower margin of the upper lid. The sclera is never clear white, but shows a light-brownish sheen, over its entire surface. The iris is dark brown without distinct vascularity, and may best be identified by the No. 3 shading in v. Luschan's eye color scheme.

Physiognomically distinctive is the nose which in general is of a narrow funnel shape, with very flat nasal wings. The nares, therefore, are small and transversely oval. The female nose is small and narrow in its entire extension. The male nose is altogether higher, but in both sexes is seen a shallow longitudinal incurvation along the entire nasal bridge down to the nasal apex. The latter is flatly rounded and continues into a narrow septum. The root of the nose is medium high.

Averages for some nasal dimensions in men and women are as follows:

Nasal height, 54.5 mm. and 51.6 mm.
Length of nasal floor, 13.5 mm. and 9.9 mm.
Depth of nasal root, 19.5 mm. and 14.9 mm.

The sexual difference is quite manifest in these measurements. The nasal bridge rises considerably in a number of tall persons, and is in its entirety slightly convex, the typical shape of the nose of the tall prairie Indians of North America. I saw a straight nose in one young man, whose father, however, had the nasal shape just described.

The lower face is moderately high without any outspoken prognathy. The integumental upper lip rises steeply, and the chin recedes somewhat. The philtrum is well developed but moderately flat. The mucous membrane lips are medium thick to thin, pale red, and medium high, 19.2 mm. and 11.1 mm. in men and women, respectively. The oval slit (rima oris) is horizontal and medium broad, with averages of 48.3 mm. and 44.3 mm. in the sexes.

4. INTEGUMENTARY ORGANS

Finally, the Yupa correspond with other Indian tribes of northern South America in certain characteristics of the integumentary organs. First of all, this concerns the skin color which, for its proper appraisal, requires a thorough cleansing of the body. Although frequent rains soak these natives on their almost daily hikes, and they often cross turbulent streams where the waters may reach above their shoulders, they never use soap, so that their skin is continually covered with dirt and fine silt. In addition, the natural skin color is more or less intensively and individually influenced by the smoke of their hut fires, since some of them prefer to stay close by the fire while others keep farther away. As is natural, they huddle closer to the fire in cold weather, and keep away from it in summertime. A careful observer, finally, has to consider that uncovered parts of the body are more directly exposed to the intense rays of the sun than are the covered parts. Therefore, it is almost impossible to determine precisely the true color shading, which is yellowish to light brown in the adults. In both sexes, the face, upper chest region and extension side of the arms are darker than all the other parts of the body, the first named parts corre-

spond to about nos. 23–24 of v. Luschan's color scheme in men, and to about nos. 22–23 in women, which means nothing more than that the covered parts of the body are distinctly lighter, as stated above. Furthermore, children below 12 are lighter than the older people. The peculiarities of skin color, just discussed, are common in the Yupa and the other Indian tribes of those wide spaces. In men, the skin feels hard and somewhat greasy, in women, rather dry and soft. Wrinkles and folds appear only in advancing years, and do not intensify much toward old age.

The Yupa possess only sparse body hair. In advanced years nearly all extensive parts of the body are completely free of downy growth. Young men already grow isolated and thick terminal hairs upon their lower legs, but very few upon their thighs, the backs of their hands, and in the pubic region. No hairs develop in the armpits of either sex. Only one man of about 28 years of age was observed with a fair amount of pubic hair. While the hair in the body regions mentioned is almost straight, the pubic hairs are slightly wavy. The head hair is thick and close, in younger persons stiff, in older ones frequently thinner and softer. The color generally is a glossy black, but single hairs may progressively turn gray and white in old age. Head hairs may fall in the course of years without however causing baldness to any great extent. The beard is scanty in general, and slightly fuller only in individual cases and, since they are not clipped, the hairs of the beard attain a considerable length and simulate a certain fullness.[19] Scantiness, form, and color of the hair of the Yupa are indicative of the Indian branch of the Mongoloids.

The finger and toe nails are thick and flat without exception, more or less broad, and much worn and torn from use and injuries.

The ears are of broad-to-oval shape without any special marks, the altogether short lobules are half or totally joined with the integument.

Only in individual persons, are the teeth in good condition and complete. The teeth are small, usually grayish to yellowish-white, but nearly white in certain adolescents. They are never taken care of, but are abused by the Indian through use in their various handicrafts. True caries was observed in about ten per cent of the adults, and about as many have lost individual teeth in accidents.

A characteristic body odor can hardly be distinguished because of the uncleanliness of these Indians, the dirt which covers their bodies never being thoroughly removed. Furthermore, day by day they are exposed to the smoke of hearth fires, and this layer adheres firmly to the skin.

It may be added here that the gait of these Indians lacks elegance and elasticity. Their whole body structure is in no way delicate, and is frequently plump, with a rectangular trunk, short lower extremities, hard muscles of the legs, and large broad feet, which in walking grip the

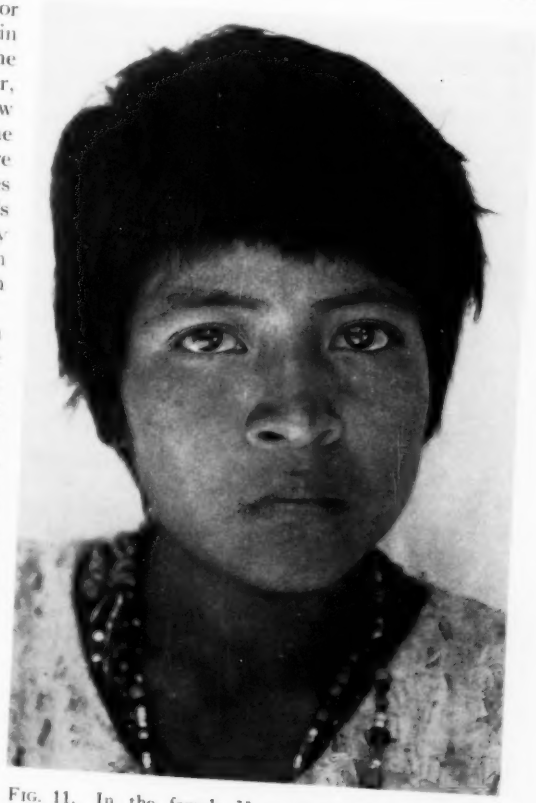

FIG. 11. In the female Yupa Indians the Mongoloid racial properties are no less manifest than in the male. A growth of very fine hair on the forehead of the young woman is a rare exception.

[19] Certain explorers have spoken exaggeratedly about the beards of a number of old men as a racial specification. But one is dealing here with a quite simple feature, since those men have never cut their typically scant beards which they have allowed to grow continuously.

ground with their entire soles. The toes spread somewhat, so that the forepart of the foot is slightly broadened. The distance between the big toe and the next toe is only moderate, but the big toe is longer than the second in the majority of men and women. However, all the toes in general are short and very hard.

The various Indian tribes of the Sierra de Perijá are much alike in their bodily features, an observation stressed by Th. de Booy (p. 395) and also for the Motilones and the Rio Grande people. In all of them the somatological typology of the natives of northwestern South America clearly manifests itself.

In the Yupa, two racial types are readily distinguished, without, however, the knowledge of their origin or causation. Unfortunately, the craniological distinctions so far have received but little attention. The first attempt at a description of an Indian skull was that by A. Ernst (*a*). This Indian had been killed in 1885 near the Rio Zulia. A. Requena has published some general remarks on the Ayamanes in 1947. A thorough investigation of 19 skulls was made by Dr. Fleury, skulls which had been acquired in 1947 by the first expedition of SCNLS near Ayajpaina in the valley of the Rio Negro. In the specimens of this series which lent themselves

TABLE 3

ABSOLUTE AND RELATIVE BODY AND HEAD MEASUREMENTS OF THE YUPA INDIANS

The absolute measurements are in millimeters (mm.), their enumeration coinciding with that of Rud. Martin's "Lehrbuch der Anthropologie" (1928)

Body measurements	Absolute		Range	
	♂	♀	♂	♀
1. Body height (Stature)	1537.8	1417.8	1337–1747	1288–1544
4. Suprasternale height	1254.8	1153.2	1166–1440	1057–1261
5. Omphalion height	906.4	825.9	760–1058	749–917
6. Symphysion height	776.3	713.0	672–889	640–768
8. Acromion height	1272.2	1165.9	1091–1448	1043–1268
9. Radiale height (right)	965.9	900.8	792–1110	807–971
10. Stylion height (right)	754.9	715.6	612–844	637–774
11. Dactylion height (right)	593.3	566.4	464–659	499–612
13. Iliospinale ant. height (right)	850.3	786.3	731–1007	691–867
15. Tibiale height (right)	410.7	371.8	358–477	327–413
16. Sphyrion height (right)	51.7	44.5	46–58	41–50
17. Arm stretch	1595.8	1449.6	1485–1818	1286–1694
23a. Height in sitting	761.5	700.8	665–858	663–776
27. Trunk length	478.4	440.2	409–551	407–493
35. Biacromial diameter	352.2	309.8	331–412	298–343
36. Transverse diameter of chest	249.8	228.4	234–279	211–264
37. Sagittal diameter of chest	186.6	174.2	166–230	158–195
39. Breadth of waist	243.4	214.2	216–291	201–243
40. Iliocristal diameter	250.0	234.7	222–287	206–265
41. Iliospinal diameter	188.1	201.4	174–216	188–216
45a. Length of arm	672.8	599.5	479–789	544–658
47. Length of upper arm (right)	306.7	265.1	277–338	236–297
48. Length of forearm (right)	211.4	185.2	180–266	160–214
49. Length of hand (right)	161.6	149.2	148–185	132–163
51. Length of middle finger (right)	94.3	84.8	87–101	71–91
52. Breadth of hand (right)	76.1	68.4	71–87	66–72
53. Length of leg (right)	810.2	747.2	691–967	651–827
58. Length of foot (standing, right)	232.9	206.5	205–266	198–215
59. Breadth of foot (standing, right)	95.8	86.0	87–108	80–94
61. Girth of chest	859.9	795.0	803–1014	745–881
62. Girth of waist	773.2	—	682–925	—
65. Girth of upper arm (maximum, right)	239.3	215.7	207–272	205–232
67. Girth of forearm (minimum, right)	148.3	133.8	132–183	124–145
68. Girth of thigh (maximum, right)	471.3	—	413–568	—
69. Girth of calf (maximum, right)	313.1	305.4	228–387	284–328

TABLE 3—*Continued*

Head measurements	Absolute		Range	
	♂	♀	♂	♀
1. Maximum head length	181.1	172.4	174–192	164–181
3. Maximum head breadth	143.1	138.4	137–151	131–146
4. Minimum frontal breadth	103.8	102.4	98–109	98–108
5. Biauricular breadth	130.9	123.3	122–140	119–130
6. Bizygomatic breadth	135.1	126.6	128–145	120–133
8. Bigonial breadth	104.8	99.6	98–117	95–107
9. Interocular breadth	35.3	33.8	28–41	32–39
10. External biocular breadth	91.7	88.8	83–101	85–95
13. Nasal breadth	40.1	34.6	22–48	31–38
14. Oral breadth	48.3	44.3	44–56	40–50
15. Auricular height	117.4	123.3	118–128	114–134
17. Physiognomic facial height	169.6	154.8	159–184	146–161
18. Morphological facial height	119.1	108.2	112–128	103–116
19. Nasion-Stomion height	77.7	72.6	72–85	64–80
20. Nasion-Prosthion height	73.4	68.5	69–78	64–75
21. Nasion-Subnasale height (nasal height)	54.5	51.6	49–61	48–58
22. Pronasale-Subnasale length (nasal depth)	13.5	9.9	8–17	8–12
25. Height of mucous lips	19.2	16.1	14–24	11–20
26. Subnasale-Stomion height (total height of lip)	22.9	21.2	21–26	17–24
29. Physiognomic ear length	59.8	57.5	56–62	51–59
30. Physiognomic ear breadth	37.4	31.6	34–40	31–39
31. Tragion-Tuberculare length (Morphological ear length)	30.2	28.2	26–34	25–32
32. Otobasion sup.-Otobasion inf. (Morphological ear breadth)	53.5	51.4	49–60	47–56
45. Horizontal circumference of head	538.6	504.9	524–570	413–536
48. Nasion-Inion arc	361.0	354.6	342–387	326–372
49. Transverse head arc	346.3	337.6	320–366	320–362
Cephalic length-breadth index	79.1	80.3	74.5–83.4	74.9–85.9

to a specific examination, Dra. A. Diaz U. undertook a quite detailed study on her own of the facial angles; but as yet an entire skeleton of a Yupa Indian has not been described. However, the craniological findings have shown a precise racial identity of the Yupa with other Indian groups in the northwest of South America.

IV. DEMOGRAPHIC DETAILS

A number of vital statistics are mentioned here to complete the above cultural and racial picture of the Indians east of the Sierra de Perijá. Originally all were settled on the open and fertile plains extending widely eastward from the foot of the mountains, from where, during several generations, they had been squeezed out by Mulattoes and Mestizos, and then made themselves unapproachable from attacks in the high mountains. The steep and forested heights, together with the cold, rainy climate, permitted them but a moderate agricultural pursuit, for which reason crowded settlements are impossible, and as a result the Yupa people are scattered, living in numerous rancherías. Each of these consists of only a few families, at times only of one, and the rancherías lie far apart one from the other, separated frequently by deep ravines and torrential streams.

In each of these small communities there exists a natural desire for a change, which is the reason for frequent visiting amongst themselves, giving rise to chicheos (drinking bouts) which last for days, and leave everyone completely overcome as related above.[20] Soon, the quarrelsome and revengeful temperament of these natives awakens, resulting in injuries and even deaths; women and girls being abused, kidnaped, or exchanged. In

[20] This custom is corroborated by Yepes who writes (p. 67): "These Bacchantic orgies take place every month when the moon is full . . .. They prepare large quantities of chicha and, when the time arrives, they engage in feasts which last from two to three consecutive days, exhilarating themselves beyond control."

TABLE 4

ABSOLUTE AND RELATIVE BODY AND HEAD MEASUREMENTS OF THE YUPA INDIANS: MALE INDIVIDUALS

(The absolute measurements are in millimeters.)

Age (in years)	24	30	26	28	22	55	26	22	23	26	22	32	45	30	65	42	22	40	36	32	23	45	30
1. Body height (Stature)	1568	1747	1582	1548	1552	1558	1545	1503	1544	1337	1478	1563	1533	1549	1646	1553	1481	1486	1511	1583	1436	1564	1503
4. Suprasternale height	1275	1440	1287	1267	1263	1272	1261	1224	1271	1081	1200	1273	1258	1254	1339	1273	1206	1226	1235	1293	1166	1268	1228
5. Omphalion height	928	1058	912	921	933	938	910	887	907	760	907	932	925	881	983	903	871	873	886	902	830	901	899
6. Symphysion height	788	889	781	778	789	796	775	770	776	672	742	797	773	766	854	774	762	771	744	781	721	780	777
8. Acromion height	1281	1448	1331	1282	1290	1293	1272	1259	1304	1091	1220	1282	1290	1262	1368	1283	1238	1231	1240	1297	1167	1292	1249
9. Radiale height	999	1110	1020	985	975	982	963	971	1001	792	926	974	983	960	1040	957	936	933	933	967	890	985	934
10. Stylion height	772	844	806	764	766	770	764	755	781	612	727	760	776	758	803	756	754	733	740	742	691	778	712
11. Dactylion height	615	659	638	603	602	602	610	593	609	464	576	594	625	609	637	594	599	581	577	570	522	613	557
13. Iliospinale ant. height	873	1007	865	872	863	871	853	838	852	731	869	883	873	858	756	864	834	837	816	848	785	853	855
15. Tibiale height	434	477	420	397	417	436	402	421	411	358	396	418	411	427	468	402	408	394	373	398	373	420	385
16. Sphyrion height	51	58	54	57	55	58	51	53	52	47	47	50	51	54	52	51	47	47	54	53	46	50	51
17. Arm stretch	1577	1818	1622	1630	1615	1588	1573	—	—	—	1545	1607	1542	1567	1647	1594	1516	1485	1589	1652	1508	1635	1612
23a. Height in sitting	780	858	801	770	763	762	770	733	768	665	736	766	760	783	792	779	719	715	767	802	715	784	726
27. Trunk length	487	551	506	489	474	476	486	454	495	409	458	476	485	488	485	499	444	455	491	512	445	488	451
35. Biacromial diameter	375	412	346	361	344	333	352	353	368	334	347	348	352	353	363	344	337	331	360	335	346	365	342
36. Transv. diam. of chest	273	279	260	248	238	239	235	254	268	250	234	247	238	244	259	237	244	257	250	241	250	252	249
37. Sag. diameter of chest	195	230	177	185	181	188	169	177	181	199	182	177	166	194	229	187	182	179	187	187	175	191	175
39. Breadth of waist	233	291	256	236	223	227	216	242	241	248	233	252	226	243	264	240	243	258	244	254	237	252	239
40. Iliocristal diameter	263	284	259	245	266	262	222	262	244	232	251	252	225	250	287	250	250	240	253	236	230	259	229
41. Iliospinal diameter	212	208	202	183	210	192	188	208	203	182	193	203	176	216	205	188	207	178	188	194	174	198	188
45a. Length of arm	666	789	693	679	688	691	662	666	695	479	644	688	665	655	731	689	639	650	663	727	645	679	692
47. Length of upper arm	282	338	311	297	315	311	309	288	303	299	294	308	307	302	328	326	302	298	307	330	277	307	315
48. Length of forearm	227	266	214	221	209	212	199	216	220	180	199	214	217	202	237	201	182	200	193	225	199	207	222
49. Length of hand	157	185	168	161	164	168	154	162	172	148	151	166	151	151	166	162	155	152	163	172	169	165	155
51. Length of middle finger	98	101	96	93	92	91	94	91	94	87	89	90	91	92	97	95	99	97	92	97	98	98	96
52. Breadth of hand	78	87	78	78	75	74	71	72	76	77	77	78	73	78	80	75	76	74	74	73	75	76	76
53. Length of leg	833	967	825	832	823	831	813	798	812	691	829	843	833	818	716	824	794	797	776	808	745	813	815
58. Length of foot	236	260	237	236	239	222	230	241	231	205	221	242	225	227	266	237	224	219	228	242	225	233	231
59. Breadth of foot	101	95	98	108	101	99	89	98	90	89	99	98	93	97	94	99	99	90	95	94	87	102	89
61. Girth of chest	951	1014	886	887	836	832	803	828	882	812	844	832	812	887	928	830	857	844	882	845	823	850	814
62. Girth of waist	792	925	790	740	702	756	665	781	796	784	682	792	750	772	901	764	757	782	770	802	772	791	777
65. Girth of upper arm	271	272	248	237	250	220	207	236	246	231	214	250	237	258	258	212	234	223	233	250	233	243	240
67. Girth of forearm	178	183	153	144	151	146	135	142	148	132	142	140	142	148	150	160	161	132	152	151	140	142	138
68. Girth of thigh	511	568	462	482	448	450	461	473	438	438	480	522	460	508	488	465	480	453	464	476	441	458	413
69. Girth of calf	339	387	326	322	298	311	302	316	287	272	296	228	290	335	320	321	326	292	330	334	318	343	308
1. Maximum head length	192	188	191	183	177	174	177	179	177	187	175	180	180	188	187	175	176	180	181	184	177	182	175
3. Maximum head breadth	145	143	148	145	141	147	138	144	140	146	138	143	141	140	146	151	139	144	144	144	141	137	146
4. Minimum frontal breadth	103	109	109	106	105	100	98	99	101	102	102	106	102	104	101	104	103	103	104	108	106	106	107
5. Biauricular breadth	133	137	131	132	133	129	124	125	129	126	125	131	128	130	134	131	122	131	137	140	134	136	133
6. Bizygomatic breadth	138	136	128	136	140	135	129	134	135	133	133	138	134	134	134	134	129	131	140	145	135	139	138
8. Bigonial breadth	102	106	108	97	105	103	101	98	102	102	104	111	102	109	106	109	103	99	105	117	105	108	108
9. Interocular breadth	36	36	36	36	38	32	28	37	35	35	38	31	41	32	39	33	33	37	39	37	34	34	33
10. Ext. biocular breadth	95	101	101	91	94	85	83	96	91	90	92	87	94	94	92	88	87	88	93	97	90	89	91
13. Nasal breadth	39	44	42	39	33	46	37	41	39	40	40	43	39	22	45	41	41	40	41	44	39	48	39
14. Oral breadth	46	56	47	44	52	58	44	44	49	49	46	48	46	45	51	48	45	47	46	48	48	55	48
15. Auricular height	132	134	125	128	124	124	127	122	119	120	120	121	120	127	124	124	121	118	118	128	114	119	128
17. Physiog. facial height	177	184	174	168	157	160	161	167	167	160	160	183	170	162	163	172	159	176	174	184	169	179	175
18. Morphol. facial height	120	128	124	114	117	116	113	119	119	112	114	125	119	119	122	125	113	121	119	129	117	119	116
19. Nasion-Stomion height	75	81	77	74	77	74	77	73	76	76	72	81	82	77	79	81	76	79	83	85	77	79	77
20. Nasion-Prosthion height	71	77	75	69	71	72	75	71	74	71	69	77	76	70	74	76	73	73	77	78	73	73	73
21. Nasion-Subnasale height	51	55	57	49	55	54	54	51	54	51	50	59	60	54	60	61	54	55	57	54	55	52	53
22. Pronasale-Subnasale h.	12	13	16	12	13	13	13	13	14	8	11	14	15	14	17	16	13	12	14	14	14	17	12
25. Height of mucous lips	22	20	18	16	22	19	19	24	20	18	22	23	22	21	16	20	17	14	15	21	18	15	19
26. Subnasale-Stomion h.	26	24	21	22	21	23	21	23	22	21	22	24	22	24	22	24	22	22	26	24	21	26	25
29. Physiognom. ear length	61	61	59	57	58	60	58	58	56	60	62	60	61	62	65	59	59	60	62	62	58	56	62
30. Physiognom. ear breadth	35	38	36	38	34	40	38	42	36	37	38	35	37	39	36	39	34	40	35	39	39	40	36
31. Tragion-Tuberculare l.	32	33	30	34	27	31	32	31	30	27	33	28	28	32	32	31	26	29	30	30	28	30	31
32. Morphol. ear breadth	50	54	52	50	49	54	53	50	52	52	52	53	57	54	59	57	52	54	56	51	53	56	60
45. Horiz. circumfer. of head	570	562	562	542	525	532	505	552	524	549	526	540	543	549	550	529	527	525	544	549	532	530	528
48. Nasion-Inion-arch	372	387	387	352	364	354	366	358	356	355	360	360	351	362	363	356	351	352	362	382	353	342	359
49. Transverse head arc	355	365	366	355	332	350	338	360	344	348	333	348	336	337	354	360	341	340	350	366	332	320	335
Ceph. Length-Breadth Index	75.52	76.06	77.49	79.23	79.66	84.48	77.97	80.44	79.09	78.07	78.85	79.44	78.33	74.47	78.07	86.28	78.98	80.00	79.56	78.26	79.66	75.27	83.43

addition to impairment of health, the fact looms up that in many cases paternity cannot be established with certainty. For irrelevant reasons many a young man changes his mate, at times without protestation from the woman's kin. The lot of these helpless females is pitiful, the more so since all heavy labor is incessantly forced upon them.

The absence of judicial institutions and of personal security is responsible for the surprisingly frequent suicides, particularly among the women. The chicheos, which are repeated several times annually, cause serious constitutional damage for all ages, and basically and progressively impair what remains of the already weakened resistance of this small group.

Their total number was estimated at 1,000 individuals at a former date, but at present there may be hardly more than 500. An accurate census of the Pariríes Indians taken in June, 1954, by the missionary, Fray Prudencio de Santelos, shows that this group of the Yupa, which lives by the Rio Yasa and the La Luna, is distributed amongst 11 rancherías and accounts for 22 men,

TABLE 5

ABSOLUTE AND RELATIVE BODY AND HEAD MEASUREMENTS OF THE YUPA-INDIANS: FEMALE INDIVIDUALS
(The absolute measurements are in millimeters.)

Age (years)	19	30	38	20	20	28	22	26	40	24	30	28	21	30
1. Body height (Stature)	1387	1544	1288	1391	1447	1486	1450	1432	1453	1336	1452	1416	1401	1367
4. Suprasternale height	1124	1261	1057			1214		1166	1197	1074	1193	1143	1135	1121
5. Omphalion height	814	917	749	—	—	860	—	850	829	778	853	—	820	789
6. Symphysion height	692	768	640	—	—	747	—	730	732	667	743	703	717	704
8. Acromion height	1147	1268	1043	—	—	1211	—	1168	1226	1101	1213	1174	1159	1115
9. Radiale height	894	971	807	—	—	930	—	906	946	847	932	916	890	870
10. Stylion height	713	774	637	—	—	716	—	731	758	669	742	712	710	710
11. Dactylion height	574	612	499	—	—	553	—	581	626	520	599	558	555	553
13. Iliospinale ant. height	754	867	691	—	—	816	—	790	822	747	794	793	803	772
15. Tibiale height	372	413	327	—	—	379	—	383	393	352	362	370	379	360
16. Sphyrion height	42	49	46	—	—	50	—	46	47	42	43	43	41	41
17. Arm stretch	1379	1555	1286	—	—	—	—	—	—	1694	1479	1427	1418	1359
23a. Height in sitting	695	776	648	—	—	739	—	702	721	669	709	703	684	663
27. Trunk length	432	493	417	—	—	467	—	436	465	407	450	440	418	417
35. Biacromial diameter	309	343	311	—	—	313	—	298	304	306	307	304	312	301
36. Transv. diameter of chest	230	264	221	—	—	211	—	232	224	220	220	237	222	232
37. Sag. diameter of chest	195	174	186	—	—	170	—	169	164	170	181	172	158	177
39. Breadth of waist	222	243	210	—	—	210	—	209	216	206	211	—	201	—
40. Iliocristal diameter	265	264	206	—	—	264	—	224	229	207	247	223	216	237
41. Iliospinal diameter	216	216	196	—	—	188	—	181	210	200	204	204	188	211
45a. Length of arm	573	656	544	—	—	658	—	587	600	581	614	616	604	562
47. Length of upper arm	253	297	236	—	—	281	—	262	280	254	281	258	269	245
48. Length of forearm	181	197	170	—	—	214	—	175	188	178	190	204	180	160
49. Length of hand	139	162	138	—	—	163	—	150	132	149	143	154	155	157
51. Length of middle finger	82	91	76	85	89	89	85	90	93	90	85	84	78	71
52. Breadth of hand	71	72	70	—	—	66	—	69	67	67	68	67	67	69
53. Length of leg	714	827	651	—	—	776	—	750	782	707	754	753	763	742
58. Length of foot	206	215	198	—	—	212	—	214	213	200	202	198	208	206
59. Breadth of foot	94	86	89	—	—	83	—	92	80	89	87	84	81	81
61. Girth of chest	845	881	762	—	—	—	—	—	772	773	—	774	745	808
62. Girth of waist	—	—	—	—	—	—	—	—	—	—	—	—	—	—
65. Girth of upper arm	232	225	205	—	—	213	—	223	203	221	210	220	208	213
67. Girth of forearm	145	143	133	—	—	132	—	135	124	137	128	132	132	131
68. Girth of thigh	—	—	—	—	—	—	—	—	—	—	—	—	—	—
69. Girth of calf	323	328	284	—	—	—	—	—	—	—	312	302	297	292
1. Maximum head length	166	179	164	171	177	172	181	170	173	176	175	172	173	165
3. Maximum head breadth	134	141	138	144	144	136	137	146	145	134	131	136	134	137
4. Minimum frontal breadth	102	105	100	108	105	102	104	106	98	98	99	102	103	101
5. Biauricular breadth	122	130	122	122	119	124	130	130	123	119	124	120	121	120
6. Bizygomatic breadth	126	129	126	125	123	130	133	131	126	127	130	122	124	120
8. Bigonial breadth	98	107	101	98	97	97	107	101	96	104	101	95	98	95
9. Interocular breadth	33	35	32	33	33	33	39	34	34	35	33	33	34	32
10. Ext. biocular breadth	86	95	88	90	87	85	99	93	88	90	86	86	85	85
13. Nasal breadth	33	38	32	34	36	36	37	37	35	35	31	35	34	32
14. Oral breadth	40	48	43	48	44	50	47	44	43	44	43	40	40	47
15. Auricular height	110	111	115	112	128	122	125	122	119	115	115	113	117	120
17. Physiogn. facial height	160	152	146	152	153	152	157	152	160	160	159	161	154	149
18. Morphol. facial height	109	112	100	102	114	103	111	114	116	103	106	110	103	112
19. Nasion-Stomion height	71	75	64	69	79	70	73	72	80	70	71	80	68	75
20. Nasion-Prosthion height	64	72	60	67	72	65	69	69	73	67	68	75	65	73
21. Nasion-Subnasale height	50	54	48	49	56	50	49	51	58	50	49	55	50	54
22. Pronasale-Subnasale height	8	10	8	9	11	8	11	10	9	11	11	12	9	12
25. Height of mucous lips	17	19	13	20	16	11	17	20	13	14	19	17	14	16
26. Subnasale-Stomion height	20	23	17	20	22	19	21	22	24	20	24	23	19	23
29. Physiognom. ear length	55	59	51	58	56	56	54	54	54	52	59	54	58	56
30. Physiognom. ear breadth	31	35	33	39	34	36	32	34	31	35	32	34	35	33
31. Tragion-Tuberculare length	25	32	31	28	27	29	26	28	29	26	26	27	31	30
32. Morpholog. ear breadth	47	51	51	56	53	56	48	53	51	51	48	50	52	53
45. Horiz. circumfer. of head	503	536	492	496	523	512	532	524	520	512	506	514	413	485
48. Nasion-Inion-arch	352	360	326	360	372	362	361	354	362	348	352	342	363	351
49. Transverse head arc	320	351	328	338	362	332	331	336	348	348	339	325	323	346
Ceph. Length-Breadth Index	80.72	78.77	84.15	84.21	81.36	79.07	75.69	85.88	83.81	76.14	74.86	79.07	77.46	83.03

27 women, 15 boys, and 17 girls of thirteen years or less. Living with them at that time were 15 adults from other rancherías. In this total of 96 persons, the small number of 32 children gives cause for thought.

Similar statistics in the Irapa district were worked out by the same missionary during the middle of November, 1954. This district comprises the four unusually large rancherías: Wosi, Kunana, Sadsapa, and Sisicacao, where 203 persons live, of whom 117 are male, and 86 female amongst them being 52 boys and 18 girls of thirteen years or less, while among the adults there are but 7 men and 4 women over 60 years. The small number of individuals in this Indian tribe, in common with the occasional change of mates, and in addition the wide distances between the rancherías one from the other, unavoidably makes for inbreeding, the consequences of which they do not seem to be aware of in the least.[21]

Of late they have shown an ardent desire to adopt Christian names, despite the fact that only a few of them have become Christians. Some are also eager in seeking connections with the Cholos and the Whites in the lowlands for the purpose of acquiring from them apparel and articles of daily use. The absence of these Yupa men from their families for days on end also adds to the dissolution of relationship ties, and the disrupting of the original tribal order and traditional discipline.

Manifestly, the very existence of the Yupa people of the eastern incline of the Sierra de Perijá is seriously threatened. These as yet pure-blooded Indians of this originally small racial type, among all the natives of northern South America, have lived for generations in the cold mountainous regions high above sea level, without sufficient food and under miserable housing and pitiful living conditions.[22] These factors, together with excessive alcoholic[23] and tobacco indulgences,[24] and a total negligence of the most necessary requirements of body care, have also added to the slight diminution of stature. On the basis of this feature, and in the case that its average for all the males remains below 150 cm., this Indian tribe must be classified as "pygmy." However, it does not mean more than an ordinary modification, since more favorable living conditions at a lower altitude might bring back a phenotype corresponding to the original racial gene constitution of this particular Indian group.

Living conditions, habits, and their consequences obtained about the Yupa people, essentially are found repeated on the western incline of the Sierra which politically belongs to Colombia. G. Bolinder and Bañeres have emphasized the fact that the Maraca Indians are extraordinarily short with likely pathological symptoms in their physical constitution. Thus, what holds good for the natives of the west of the Sierra de Perijá, holds good likewise for those of the east, namely, that quite frequently very short individuals are seen among these peculiarly short Indians, and that an equal proportion of these very short Indians are crippled. Both these deficiency phenomena are genuine modifications, in response to the peculiar environmental conditions under which these Indians have lived for generations.

[21] Wavrin writes (p. 113): "As to the pygmoid Motilones, I stated that there are frequent marriages between relatives, even between brother and sister, which doubtless is one of the reasons for their physical degeneration. Mentally, these pygmoids are just as intelligent as their normal neighbors, and just as courageous, active, generous and enduring, etc." In the wide area of the Rio Negro not a single case of matrimony or sexual relation between brother and sister has come to my knowledge.

[22] Fernández Yepes (p. 66) describes their living quarters as follows: "In these dirty dwellings, the size of which in the majority of cases does not exceed 16 square meters, live in complete promiscuity 8, 10 or more persons, men, women and children, without the slightest indication of the most elemental requirements of hygiene. This is the reason for the unusual frequency of the many diseased Indian children."

[23] Th. de Booy (p. 202) reports from his own experience: "About midnight the Indians were extremely drunk, men, women and children alike, it being their custom to give chica even to the infants."

[24] Reichel-Dolmatoff (p. 45) writes: "Everybody smokes, men and women pursue their work with the pipe between their teeth, and the children change successively between the breasts of their mothers and the pipe."

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FINGER AND PALM PRINTS OF YUPA INDIANS

GEORG GEIPEL

Berlin-Dahlem

The material investigated in this supplement is limited, but valuable because of the sparseness of such data. The following account is an abbreviated version of the detailed work by the present author entitled "Tastleistenbefund bei Yupa-Indianern West-Venezuelas" (Dermatoglyphics in the Yupa Indians of West Venezuela) to be published in *Zeitschrift für Morphologie und Anthropologie* **47** (Stuttgart, 1955).

The findings are the result of finger- and palmprints of 19 Indians obtained under difficulties by M. Gusinde.

The fingerprint patterns of 180 available fingers represent 34.4 per cent whorls (both spiral and double-loop types), 60.6 per cent loops (ulnar and radial), and 5 per cent arches (plain and tented). All the patterns are of normal appearance and contain none which might be termed rare. This percental distribution of the Yupa fairly corresponds with that of the Combe Negroes of Spanish Guinea as published by Pons (1951), which however represents men exclusively, while among the Yupa are eight women. The Yupa men have almost twice as many whorls as the women, while the latter have about four times as frequently arches as compared with men. This notable difference however should not be generalized, even if sex-conditioned in all peoples, since it might be of random occurrence in the Yupa on account of the small number of persons involved. But it is surprising that the distribution of patterns deviates essentially in comparison with that of two other American groups, the Guayaki of Paraguay (Ötting), and the Central Americans (Cummins). It is impossible to decide whether this difference is due to the small numbers of these three groups involved. The average quantitative value 12.0 for 170 fingers exceeds this author's average of 9.6, the lowest so far found, as occurring in the Bambuti, and somewhat equals those for the Pamue and Bubi Negroes as found by Pons (1901).

The frequency of the hereditary combinations of V,v; R,r; U,u; determined after the method of Bonnevie, show a contribution fairly coinciding with those of the Combe Negro (Pons).

The investigation of the palmar main lines of the Yupa shows an extraordinary bimanual asymmetry in the endings of those main lines (after Cummins), the right/left ratio of the indexes amounting to an average of 146.

Striking features of the main lines are the drastic turn of the A-line toward 1 and 2 (34.2 percent), and the frequent absence of the *C*-line which, with the inclusion of three reductions, occurs in 36.8 per cent of 38 hands. The absence of this line in as many as 33.8 per cent likewise has been reported by Ötting for the Guayaki, and up to 11 per cent by Cummins for Central Americans.

Absence of the *C*-line is an indication of non-occurrence of the volar pads at triradius *c*, in the third and fourth interdigital areas. And even

where pads are manifested by loops, these in most cases can be identified by only a few parallel non-recurrent ridges and thus deviating from the typical pad formation. The hypothenar too bears patterns only rarely, but the threefold figure of Bettemann upon the thenar and in the first interdigital space, occurs in 52.6 per cent of left hands; it may occur in right hands, but more rarely, and that holds for other peoples too.

Of the axial triradii, the intermediary t' is represented in 60.5 per cent, and the carpal t in only 42.1 per cent, which is all the more striking since t was found in 78.0 per cent by Ötting in the Guayaki. Almost entirely absent in both, and in the Central Americans, is the palmar triradius t''.

The flexion furrows, which however do not belong in the papillary system, are in most cases normally developed, and this in regard to the thumb, the three and five fingers. Only two typical four-finger furrows ("Simian lines") occurred, but there were numerous intermediate stages.

CHARACTERISTICS OF HAIR OF YUPA INDIANS[1]

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Samples of head hair from Yupa Indians in Western Venezuela, South America, were collected by Father Martin Gusinde in June, 1954, and added to the hair collection of this laboratory. It is a pleasure to acknowledge Father Gusinde's gift and to offer this report on the hair as an appendix to his treatise on the anthropology of Yupa Indians.

Twenty-three samples are available. The individuals from which they came are 14 males ranging in age from 7 to 36 years and 9 females ranging in age from 6 to 15 years. The lock of hair in each case was cut from the side of the head between the upper border of the ear and the vertex. The color, form, index, cross sectional area, and incidence of medullation of these hairs have been studied and the findings compared with those recorded for groups of Indians in North America and for other groups of Mongoloids.

The index $\left(\frac{\text{least diameter} \times 100}{\text{greatest diameter}}\right)$ and cross sectional area ($\frac{1}{2}$ greatest diameter $\times$ $\frac{1}{2}$ least diameter $\times$ 3.1416) were determined on 50 hairs from each sample. Only the averages of these determinations are presented. The hairs were prepared for measurement by sectioning with the Hardy microtome (Trotter and Duggins, 1948); the area is recorded in sq. mm. From each sample 25 hairs were examined for medullas. The incidence of hairs presenting a medulla, whether continuous, broken or scanty (Duggins and Trotter, 1950) is given in per cent of the number of hairs examined.

The color of all the samples is within the brown-black range of the Haarfarbentafel of Fischer and Saller (1928). All the hairs are straight with no evidence of waviness.

The objective data obtained from each sample are shown in table 6.

There is no appreciable difference between the males and females for either index or cross sectional area; for the total group the average index is 85.0 and the average cross sectional area is .0045 sq. mm. On the other hand, the incidence of medullation is very much higher in the hair of the males (78.8 per cent) than of the females (48.0 per cent). It should be noted that the male group includes four subjects who are older than any subject in the female group. By including the data of these four subjects the averages are affected slightly; the index is lowered, the cross sectional area is increased, and the incidence of medullation is increased. Comparable trends with increase in age have been observed in hair of American Whites. The effect of these trends on the averages of the total male group is not sufficient to warrant further analysis.

A comparison of these findings with data derived from several North American Indian groups and from three other groups of Mongoloids (table 2) is of interest. The study by Steggerda and Seibert (1941) was based on

[1] This investigation was supported (in part) by a grant-in-aid from the Wenner-Gren Foundation for Anthropological Research, Inc.

TABLE 6

DATA FROM HAIR SAMPLES OF YUPA INDIANS ACCORDING TO AGE AND SEX

Subject (no.)	Age (years)	Index $\frac{\text{l.d.} \times 100}{\text{g.d.}}$	Area (sq. mm.*)	Medulla incidence (per cent)
Males				
1	7	89	42	88
20	7	86	41	92
2	8	88	29	59
25	8	88	37	92
22	10	84	42	92
23	12	89	44	80
3	13	86	50	80
21	13	78	54	92
5	14	86	35	52
11	14	90	35	28
18	20	77	65	92
7	28	76	55	76
6	32	86	60	88
4	36	79	65	92
Total		84.4	46.7	78.8
Females				
13	6	79	37	96
8	10	82	30	32
24	10	93	43	96
12	12	88	38	40
19	12	88	57	64
16	13	90	38	24
26	14	89	44	52
9	15	88	48	20
10	15	77	47	8
Total		86.0	42.4	48.0
Combined total		85.0	45.0	66.7

* Each figure for area should be preceded by .00; thus, 42 = .0042 sq. mm.

subjects with an age range from 9 to 19 years; the ages of the subjects studied by Woodbury and Woodbury (1932) are not known; and, the other Mongoloids studied by the present authors are young adults. Each study includes subjects of both sexes.

It is unfortunate that the table cannot be completed and especially that the cross sectional area of the hair of the Basket Maker group is not known, since its index resembles the index of the present samples. It may be seen that both index and cross sectional area of the hair of Yupa Indians resemble these characteristics of North

TABLE 7

DATA FROM HAIR SAMPLES OF NORTH AMERICAN INDIANS AND OTHER MONGOLOIDS

Author	Group	Index $\frac{\text{l.d.} \times 100}{\text{g.d.}}$	Area (sq. mm.*)	Medulla incidence (per cent)
North American Indians				
Steggerda and Seibert, '41	Hopi	81	43	
	Maya	83	45	
	Navajo	80	41	
	Zuni	77	41	
Woodbury and Woodbury, '32	Mesa Verde	80		
	Basket Maker	83		
Other Mongoloids				
Trotter and Duggins, Unpublished	Eskimo	79	46	74
	Thai	82	52	
	Chinese	80	60	73

* Each figure for area should be preceded by .00; thus, 45 = .0045 sq. mm.

American Indians and other Mongoloids, but resemble most closely the Maya group of Indians. This is of particular interest since the Mayas are more closely related to the Yupas geographically than is any of the other groups. (To attach undue signifiacnce to similarities based upon such limited samples is unwise.) It should be noted that all these characteristics are quite different from those found for hair of various and widely scattered groups of Australoids, Caucasoids and Negroids (Duggins and Trotter, 1954).

The medulla incidence in hair has not been determined for many groups. For the Yupa Indians the males resemble other Mongoloids in this character. A sex difference in incidence of medullation has been found in hair of American Whites in the age range from 6 to 14 years with females having the lower incidence (Duggins and Trotter, 1950). The lower incidence in the hair of female Yupa Indians than of the males lends support to the possibility of a sex difference in incidence of medullation. The range of medulla incidence among various groups of Australoids, Caucasoids and Negroids is from 26 to 65 per cent (unpublished data). In general, it may be said that the incidence of medullation shows wide variation among individuals of the same group as well as among groups of the same racial extraction. In other words, this characteristic of the human hair shaft shows less racial distinction than do either index or cross sectional area.

SUMMARY

Hair samples from 23 Yupa Indians are of a brown-black color and of a straight form. The average index and the average cross sectional area resemble these characteristics of hair of North American Indians and of other Mongoloid groups. The incidence of medullation of hair of males is similar to that found for other Mongoloid groups, but the incidence in the hair of females is lower than might be expected.

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ARCHAEOLOGY OF THE LIND COULEE SITE, WASHINGTON

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With additions by Charles D. Campbell, Harold E. Culver, Lee G. Nering, and Betty J. Enbysk

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INTRODUCTION

THE reclamation and electric power developments in the Columbia Basin region of the State of Washington have indirectly brought about an intensive program of archaeological research in those areas to be inundated by the rising reservoir waters of the various dams. Each summer since 1946 has witnessed the archaeological surveys of reservoir areas and the excavation of important archaeological sites.

To date, the bulk of the archaeological research has been carried out in the McNary, O'Sullivan, Equalizing, and Chief Joseph Reservoirs.

During the summer of 1947, F. A. Riddell and the writer were employed in the River Basin Surveys program to survey and evaluate the archaeological and paleonto'ogical resources of a number of reservoir areas in Washington, Idaho, and Montana. In the reconnaissance of the O'Sullivan Reservoir (then called the Potholes Reservoir) and the interconnected system of canals and wasteways of the Columbia Basin irrigation project, a locality in Lind Coulee was visited where stone flakes and bison bones were observed protruding from the vertical east wall of the coulee. The nature of the deposits, the depth of the flakes and bone fragments from the surface (*ca.* 14′), and the heavily mineralized state of the bones, suggested to the archaeologists the possible existence of an archaeological site containing evidence of Early Man.

Lind Coulee is one of the westernmost of the scabland channels which were carved by meltwaters of late-Pleistocene glaciers. A complex system of fluvial, lacustrine, and loessial deposits is exposed in the profile of the eroded walls. Under the irrigation project, its channel will serve as a natural wasteway, collecting irrigation runoff and diverting it to the O'Sullivan Reservoir.

A large share of the credit for the discovery of this important site properly belongs to Professor George Beck of Central Washington College of Education, and to a number of the townspeople of Warden, Washington, who long have been familiar with the exposed walls of Lind Coulee as a productive source locality for the collecting of paleontological specimens, and who, on numerous occasions, have picked up artifacts and chipping debris from the area of the coulee floor contiguous to the site.

The results of the original survey appeared in the mimeographed report on the archaeological surveys of several central Washington reservoirs (Drucker, 1948: 18–20).

During the summer of 1948 the writer directed a crew in the excavation of a recent Indian village site situated on the shore of nearby Moses Lake. On several occasions the field party made brief surveys of the locality in Lind Coulee where the outcropping of bones and flakes had been observed. But, owing to the erosion of the coulee by the spring run-off, no additional finds were made.

In the summer of 1950, while the writer was again conducting excavations at another Moses Lake village site, further attempts were made to establish with certainty whether or not an early archaeological site existed in Lind Coulee. After several unsuccessful visits to the suspected site, the writer discovered the basal portion of a stemmed projectile point imbedded in the coulee wall.

Several days later Louis Caywood and Dr. John Corbett, National Park Service archaeologists, visited the excavations at the Moses Lake site. Wishing to secure their opinion, the writer conducted them to the Lind Coulee locality. At the same level and a few feet downstream from the spot where the fragment of a projectile point had been found, Caywood discovered a large keeled scraper projecting from the deposits.

The discovery of the two artifacts led the writer to request permission from Dr. Douglas Osborne, then director of the West Coast office of the Smithsonian Institution River Basin Surveys, to shift the crew from the Moses Lake site to Lind Coulee for testing operations during the final ten days of the season. Two deep test trenches were extended for a short distance into the coulee wall at the points where the artifacts had been found. In the testing operations, quantities of mineralized bone fragments, chipping debris, and several artifacts were recovered, establishing the fact that a camp site, probably of considerable antiquity, had been located in the deep sedimentary deposits bordering Lind Coulee.

As a result of the favorable action of the State College of Washington Committee on Research, a grant enabled the writer to conduct archaeological research at two important sites in the Columbia Basin during the summer of 1951. One of the sites investigated was the Lind Coulee Site. Through the cooperation of Dr. Douglas Osborne, funds aiding the 1951 excavations were received from the Agnes H. Anderson Fund of the University of Washington. Dr. Frank H. H. Roberts, Jr., director of the Smithsonian Institution, River Basin Surveys, graciously contributed many services and much helpful advice. When the excavators faced the task of removing up to fourteen feet of sterile overburden which blanketed the site, John M. McGregor of Hooper, Washington, generously donated the services of one of his bulldozers and an operator. The writer wishes to express his thanks to Clarence Kissler of Warden, Washington, who permitted the excavators to establish headquarters at a ranch house on his land.

Work at the Lind Coulee Site during the summer of 1952 was carried on under a generous grant from the National Park Service. The cooperation and encouragement of Louis Caywood and Dr. John Cotter, National Park Service archaeologists, is largely responsible for making the 1952 excavations possible. Dr. Frank H. H. Roberts, Jr., again assisted with many services, and John M. McGregor continued his gracious assistance. Earl Terwilliger of Warden generously permitted the use of his ranch house for the season.

To Dr. Charles D. Campbell, Dr. Harold E. Culver, and Lee Nering, the author is deeply indebted for their enthusiastic cooperation in making the preliminary investigations of the geology of the site. The author wishes to express his thanks also to Drs. Herbert Friedmann, C. Lewis Gazin, Joseph P. E. Morrison, and Theodore E. White for their identification of the paleontological specimens, and to Mrs. Betty Enbysk for her field study of the paleontology of the Lind Coulee area and of the site.

The excellent drawings of the artifacts were prepared by Steve Allured, artist for the Office of Publications of the State College of Washington.

And finally, the author wishes to express his gratitude to the members of the field crews who contributed so much to the success of the excavation.

THE SETTING

Located in the southwest quarter of Section 1, Township 17 North, Range 31 East, in Grant County, Washington, the Lind Coulee Site physiographically falls within the Central Plains section of the Columbia Basin which is one of four subprovinces of the Columbia Intermontane province.

The Central Plains section is drained by the Columbia River and several of its tributaries. With an underlying base of basalt flows, the surface deposits consist of stream, lake, and windblown materials of varying thickness. These deposits date from late Miocene to Recent times.

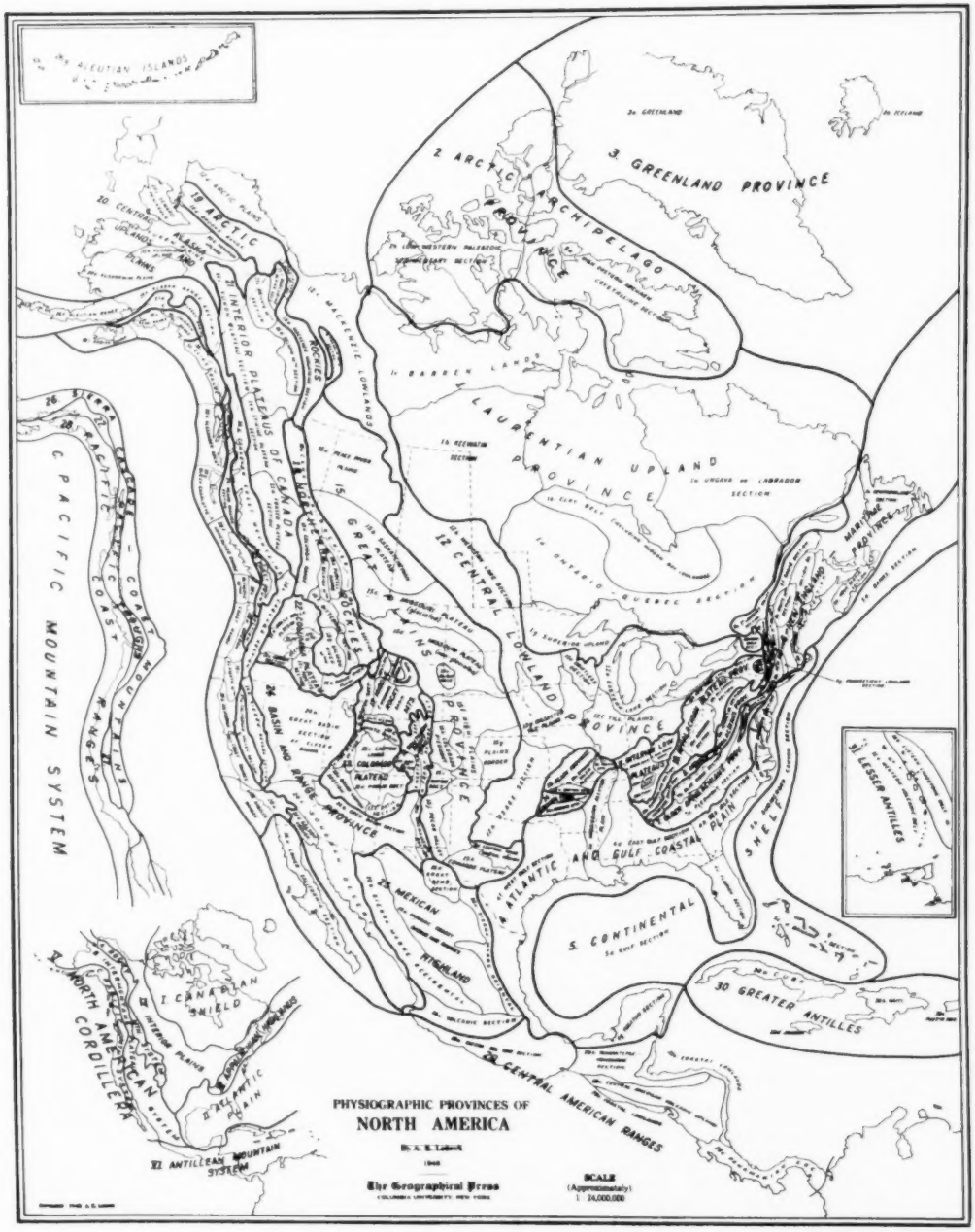

PHYSIOGRAPHIC PROVINCES OF
NORTH AMERICA
The Geographical Press
SCALE
(Approximately)
1: 24,000,000
1 ALEUTIAN ISLANDS
2 ARCTIC ARCHIPELAGO PROVINCE
2a GREENLAND
3 GREENLAND PROVINCE
3a ICELAND
4 LABRADOR PENINSULA
5 LAURENTIAN UPLAND PROVINCE
6 MARITIME PROVINCE
7 CENTRAL LOWLAND PROVINCE
8 GREAT PLAINS PROVINCE
9 INTERIOR PLATEAUS OF CANADA
10 CENTRAL ALASKA PLATEAUS AND PLAINS
11 MACKENZIE LOWLANDS
12 ROCKIES
13 ARCTIC PLAINS
14 PACIFIC MOUNTAIN SYSTEM
15 PACIFIC COAST RANGES
16 PACIFIC COAST TROUGHS
17 COLUMBIA PLATEAU
18 BASIN AND RANGE PROVINCE
19 MEXICAN HIGHLAND
20 ATLANTIC AND GULF COASTAL PLAIN
21 CONTINENTAL SHELF
22 LESSER ANTILLES
23 GREATER ANTILLES
24 CENTRAL AMERICAN RANGES
25 NORTH AMERICAN CORDILLERA
26 CANADIAN SHIELD
27 INTERIOR PLAINS
28 APPALACHIAN HIGHLANDS
29 ATLANTIC PLAIN
30 ANTILLEAN MOUNTAIN SYSTEM

FIG. 1.

CLIMATE

A discussion of climatological data is important not only for establishing the geographic setting, but also because climate can be made to serve as a factor in dating cultural deposits. It is of further importance because of the effects that alterations in climate may have on food supply and in turn on the movements and distribution of human populations.

Important evidence for recording and dating the successive climatic changes since late-Pleistocene times is to be derived from pollen analysis or palynology, and the radiocarbon dating of pollen profiles. Correlation of results derived from these sources with geological and cultural data presents an emerging pattern of climatic variation since the late stages of continental glaciation. The following discussion is based on the assumed reliability of certain radiocarbon dates. If at some later time these dates should be proved in error, the relative sequence of events will remain.

The radiocarbon dates for wood (spruce) and peat samples from the Two-Creeks horizon in Wisconsin offer a fixed starting point for this discussion. An average date of 11,404 plus or minus 350 years was determined from five samples taken from a deposit of peat underlying Mankato till (Flint and Deevey, 1951: 262). It follows that the Mankato maximum must be younger than the above date. How much younger is indicated by the types of pollen from the peat—grasses, arctic mosses, and spruce. These specimens indicate a periglacial climate and suggest that the Two Creeks period was of short duration. Flint and Deevey suggest a period of from 200 to 400 years from the death of the spruce trees until the Mankato maximum was reached (*Ibid.*, 263). On this basis the Mankato maximum is dated at approximately 11,000 years ago.

The brief period of warming following the Mankato substage was followed by the limited advance of Cochrane ice. Although the Cochrane advance was of a localized nature, most of the United States probably experienced generally lowered temperatures and increased moisture.

One consequence of the advancing glacial ice may have been the pushing of the storm tracks south of their present position, producing greater moisture in regions now arid. Some authorities refer to these periods of increased humidity as pluvials. Kirk Bryan in a very pertinent and informative statement, objects to the use of the term pluvial by pointing out that,

> . . . "pluvial" implies greater rainfall or heavier rainfalls. Thus the term has an unfortunate connotation. It is entirely possible that during periods of ice advance, that is the strictly "glacial" stages of the Pleistocene, increased rainfall actually took place in some of the present arid regions and also in the subtropical parts of the earth. However, most of the evidence of the climatic change, such as high lake levels, and fossil plants and animals, merely indicates a greater economy in the hydrologic cycle. Reduced evaporation from free water surfaces and reduced transpiration from plants such as might result from lowered temperatures, particularly in summer, would be effective in producing higher lake levels. A general increase in vegetative cover and a more sustained flow of streams and springs would also take place. To interpret the evidence so as to infer that these time intervals were "pluvial" implies too much; it is sufficient to say that they were relatively wetter (Bryan in Haury, 1950: 93).

Hurt's suggestion that the radiocarbon dates from the Lime Creek sites in Nebraska should, perhaps, be correlated with Cochrane rather than Mankato would date the beginning of this cool, moist period after 9500 before present (B.P.). This climatic phase appears to have lasted beyond the period of Cochrane glaciation.

In his studies of climatic sequence in the Great Basin, Antevs has named the period of time from 9000 B.P. to 7000 B.P. the Anathermal period. This period was characterized by a climate cooler and more moist than that prevailing at present (Antevs, 1948: 176).

Pollen profiles from eastern Washington indicate that,

> The initial forests (following the retreat of the glacial ice) consisted largely of lodgepole, but with considerable western yellow pine. Yellow pine may have persisted south of the lodgepole pine belt near the ice front. As the climate warmed and the physiographic conditions left in the wake of the retreating ice became stabilized, yellow pine gained predominance, but continued warming and desiccation favored an influx of grasses, Chenopods, and Composites (Hansen, 1947: 108).

The next climatic phase in the Great Basin, and apparently in the Columbia Intermontane province as well, is characterized by temperatures higher than those prevailing at present. During this period, drought conditions are recorded for the Southwest-Great Basin area. Antevs refers to this period of time, lasting from approximately 7000 to 4000 B.P., as the Altithermal period. These warm, dry climatic conditions brought

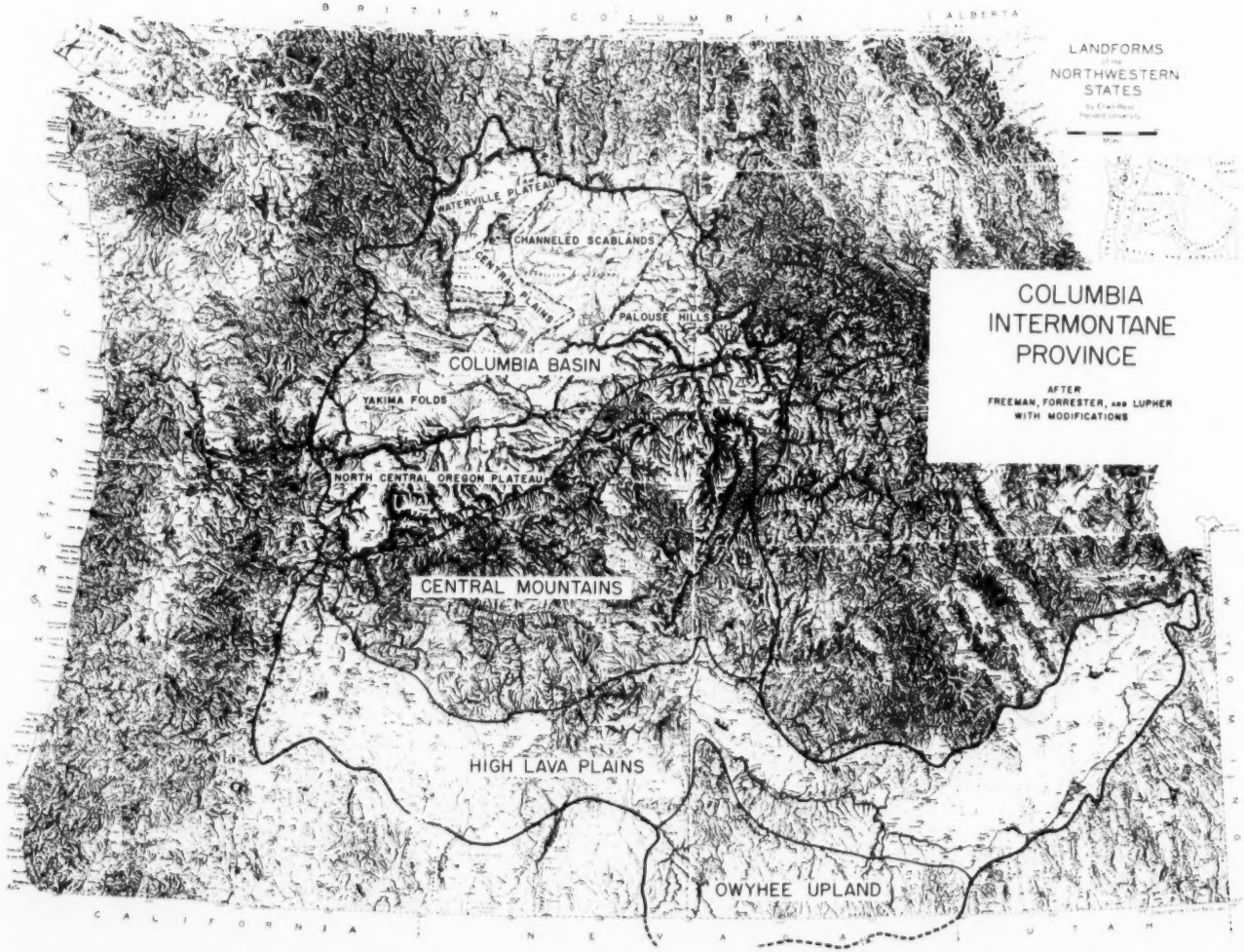


FIG. 2. The Columbia Intermontane Province. The base map is published by Erwin Raisz and is used by his permission.

about the drying up of many lakes and the disappearance of mountain glaciers.

Commenting on the pollen evidence for a period of maximum temperatures between 8,000 and 4,000 years ago in the Columbia Basin, Hansen states,

> This rise of Xerophytic groups of plants so consistently recorded would seem to be almost irrefutable evidence for the incidence of a warm dry climate. Its culmination before the volcanic activity and its waning soon after mark its synchroneity with the less strongly expressed climatic maximum of the Puget Sound region (Hansen, 1947: 117).

In discussing evidence for a similar period in the Rocky Mountain area, Hansen states,

> Evidence for this Xerothermic stage is also revealed in peat sections from Glacier Park in northwestern Montana and in south central Alberta . . . indicating that a climatic maximum was felt as far east as the Rocky Mountain region (Hansen, in Moss, 1951: 116).

The peak of the thermal maximum appears to have been reached prior to 5000 B.P. According to Deevey, the warm moist period recorded in the pollen deposits in Connecticut was drawing to a close by this time (Deevey, 1951: 57). By about 4,500 years ago, a cool, moist climate began to prevail in western North America. The onset of this climatic phase marks the rebirth of lakes and mountain glaciers. Antevs terms this new period the Medithermal.

As evidence of decreasing temperatures and increasing moisture in eastern Washington since his estimated 4,000 years ago, Hansen notes a rapid increase in yellow pine with grasses at first remaining static and later contracting (Hansen, 1947: 108, 114). Minor fluctuations in climate characterize this last climatic period.

It is evident from the foregoing discussion that the period since the final retreat of the glaciers was marked by pronounced climatic variability. Further archaeological research in the Columbia Intermontane province may find this climatic variability reflected in the cultural data.

Modern weather records for the Lind Station, located approximately eighteen miles east of the Lind Coulee Site, indicate a relatively arid climate with marked temperature extremes prevailing at present.

TABLE 1

TEMPERATURE AND PRECIPITATION RECORD FOR LIND, WASHINGTON

Month	Precipitation (30-year record)	Temperature (27-year record)
January	1.09	(Av. 27.7 F.) (Min. −33 F.)
February	0.90	
March	0.79	
April	0.68	
May	0.66	
June	0.84	
July	0.20	(Av. 72.9 F.) (Max. 116 F.)
August	0.31	
September	0.57	
October	0.73	
November	1.36	
December	1.36	
Annual	9.49	

Source: U. S. Department of Agriculture, *Climate and Man*, Yearbook of Agriculture, 1170, Washington, Government Printing Office, 1941.

FLORA AND FAUNA

In discussing the flora and fauna of the Pacific Northwest, Dalquest and others have employed the life-zone theory of plant and animal distribution (Dalquest, 1948). For descriptive convenience as well as an operational concept, the life-zone theory serves a functional purpose and will be utilized in this discussion.

The Columbia Basin physiographic subprovince lies within the Upper Sonoran life-zone. Daubenmire has defined the central portion of the region as the *Artemisia-Agropyron* vegetation zone (Daubenmire, 1942: 53–79). In describing the region he states,

> The low rainfall . . . and high temperatures, plus the omnipresence of shrubs, give the region some important characteristics of a true desert. On the other hand, the closed nature of the plant cover, and the dominance of grasses in the community, link this association closely with the grassland formation. Perhaps the designation of semidesert is most appropriate (*ibid.*, 62).

Common surface features include sandy areas, areas of bare ground, areas of open sage, and exposed basalt outcroppings with their bare talus slopes. Grasses and shrubs are the typical vegetation. Bunchgrass (*Agropyron inerme, Agropyron spictatum*), foxtail (*Alopecurus aequalis*), cheat grass (*Bromus tectorum*), saltbrush (*Atriplex truncata*), greasewood (*Sarcobatus vermiculatus*), mustard (*Arabis* sp., *Brassica* sp.), sagebrush (*Artemisia rigida, Artemisia tridentata*), rabbit brush (*Chrysothamnus nauseosus, Chrysothamnus viscidiflorus*), and cactus (*Opuntia polyacantha*) are common. Cottonwood (*Populus*

hastata) and willow (*Salix*) are to be found along the streams where sufficient moisture is available.

The mammalian fauna of the Columbia Intermontane province has apparently changed but little since late Pleistocene times. By late Pleistocene most of the mammals now present were as they are today. The main changes appear to be the loss of extinction of certain large forms. Several carnivores, the great lion (*Felix atrox*), the short-faced bears (*Tremarctotherium*), the dire wolf (*Aenocyon*), and the saber-tooth tiger (*Smilodon*), all former residents of the province, became extinct about this time. Other now-extinct forms from the region include the giant beaver (*Castorides*), peccaries, camels, bison, horses, and the giant ground sloth.

The mastodon and several species of mammoths also disappeared, but at least one species of mammoth, *Elephas columbi*, lasted into postglacial times. The remains of such a specimen have been found in Vashon till (Dalquest, 1948: 54). According to Dalquest (*ibid.*, 59) there is evidence from the present distribution of mammalian forms that the Vashon-Wisconsin ice sheets had a rather profound influence on animal life. Rocky Mountain (including the Blue Mountains) and Pacific Coast fauna were apparently separated for a long period of time, at least in the northern part of the area. The great movements of fauna came after the retreat of the ice, and there is some evidence to suggest that these migrations are still in progress.

The bringing of tens of thousands of acres of the *Artemisia-Agropyron* semidesert region under cultivation in conjunction with the Columbia Basin irrigation project is rapidly altering the vegetative picture in the region.

ETHNIC BACKGROUND

The Lind Coulee Site location falls within the territory generally stated to have been occupied in recent times by the Columbia Indians (Teit, 1928; Spier, 1936; Ray, 1939). Teit identifies the specific division or band as

> . . . tskowa'xtsEnux or skowa'xtsEnEx of Priest's Rapids and neighborhood. The band now called Moses-Columbia represents these people, and in fact consists of the remnants of all the Columbia who inhabited the Columbia Valley and east side of Columbia River. Most of them are by origin Priest's Rapids people. They are named after Moses, their late celebrated chief (Teit, 1928: 94).

Remnants of this band now reside on the Colville Indian Reservation in northcentral Washington.

Linguistically, these people spoke a dialect of the Columbia Language which belongs to the Southwestern Group of the Interior Division of the Salishan Family (Smith, 1953: 94).

The political organization of the Columbia consisted of locally autonomous villages, with a slight tendency toward tribal organization; chieftanship was based on heredity and status. The tendency toward tribal organization and the emphasis on heredity and status as prerequisites for leadership are ideas introduced to the group probably rather late in its history.

The economic orientation of the Columbia was toward the seasonal runs of salmon in the Columbia River and its tributaries; toward the hunting of large and small game animals, which necessitated trips into the Cascade Mountains and to the Plains east of the Rockies; and toward the gathering of roots, berries, and seeds. The arid, semidesert area in the vicinity of the Lind Coulee Site probably was of little economic value to the recent Indians whose villages and campsites tended to concentrate along the rivers.

In late prehistoric times the semisubterranean earth lodge with entrance at top center appears to have been an important type of winter dwelling. The winter villages were usually located along the Columbia or its tributaries at places where an adequate supply of wood and water were available. In the spring and summer, rectangular lean-tos and conical tents were the usual forms of shelter (Teit, 1928: 114). By historic times, the rectangular mat lodge was replacing the semisubterranean earth lodge as the winter dwelling. The writer has located numerous recent villages and camp sites along the Columbia River and around Moses Lake, but has never discovered evidence of sizable villages or campsites away from the water.

The implements of bone and stone which were manufactured by the Columbia Indians differ little from those possessed by other Indian groups of central Washington. The bow and arrow was the principal weapon, with spears, clubs, and knives also being used. An inventory of their stone tools would include chipped stone projectile points, most commonly triangular in shape with side or corner notches; knife blades which were frequently oval in shape; celts ground into shape from serpentine and nephrite; scrapers of several types, including flake scrapers and flat river cobbles that had been given rough edges through percussion flaking methods; whetstones; stone mortars of various sizes, some of which carried ornamentation along the borders; flat grinding stones which

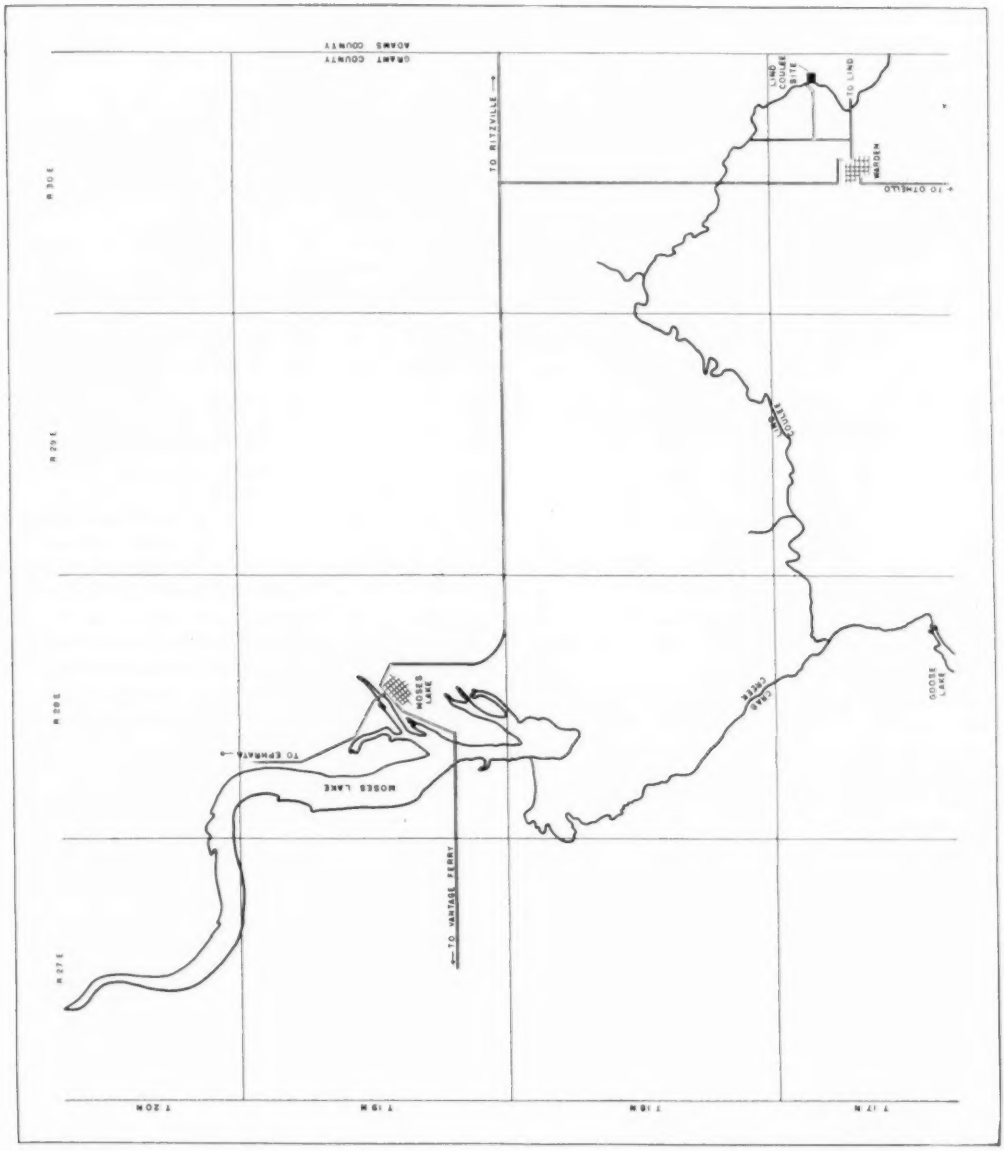


Fig. 3. Location of the Lind Coulee Site.

were probably used with open-ended basket hoppers; stone pestles, some conical and some with expanded bases and tops; hammerstones; mauls; tubular and elbow pipes of soft stone; drills; and the ever abundant notched sinkers for nets or lines (Daugherty, 1952: 374–383).

A similar inventory of the bone artifact types would include flaking tools of antler and bone; bone awls, including ulna awls and other straight awls; fish-spear points; incised gambling pieces; and a few bone arrow and spear points.

Ornaments for personal adornment were most commonly made of shell, bone and animal claws, although within the historic period, copper was widely used. Perforated discs of shell and bone were strung as necklaces. Pendants have been found which were made of shell and quartz crystals; claw pendants were very common.

ARCHAEOLOGY

METHODS

Field Methods

Following the discovery of the two artifacts protruding from the coulee wall in the summer of 1950, two test trenches 5 feet wide by 10 feet long oriented magnetic N–S, were extended into the deposits at the points where the artifacts had been discovered. Prior to the excavation of the test trenches, a permanent datum point was established at the edge of the coulee on the side opposite the site.

FIG. 4. Beginning testing operations at the Lind Coulee Site (1950). The top of the cultural horizon occurs approximately one foot above the floor of the test trenches. View facing east-southeast.

FIG. 5. Bulldozer at work removing sterile overburden from culture-bearing stratum. The overburden was removed to the level of the flat-topped pedestal in right-center foreground. View facing east.

At the beginning of the 1951 season a plane table survey was made of the site, and a contour map with 1-foot intervals was drawn. A grid system was then established with N–S and E–W base lines. Lind Coulee, at this point, runs nearly true north and south, so it was convenient to establish a zero-east-west base line through the datum point. Because at this time the extent of the site in a north–south direction was unknown, datum point was arbitrarily assigned the location of 100 feet north. This was done so that all artifact locations would fall north and east of a hypothetical 0–NS/0–EW datum point. The site was first staked out in 25-foot squares; the areas to be excavated were later staked out in 5-foot squares as the need arose.

Further testing operations to determine the depth of the cultural horizon continued. When its depth from the surface had been accurately defined, and when it was certain that the overburden was sterile of cultural and paleontological specimens, a bulldozer was employed to remove a large section of the overburden. Much of the sterile material was pushed into the coulee, leaving a wedge-shaped cut approximately 100 feet wide at the edge of the coulee, and tapering to approximately 35 feet wide 50 feet back from the coulee wall. During this operation a safety zone of sterile sand 1 foot thick was left covering the cultural material. From 10 to 12 feet of sterile material were removed by the bulldozer, leaving a surface averaging 1152.5 feet above sea level. To facilitate the excavations of the 1952 season, a larger area to the north was similarly bulldozed to the same approximate level.

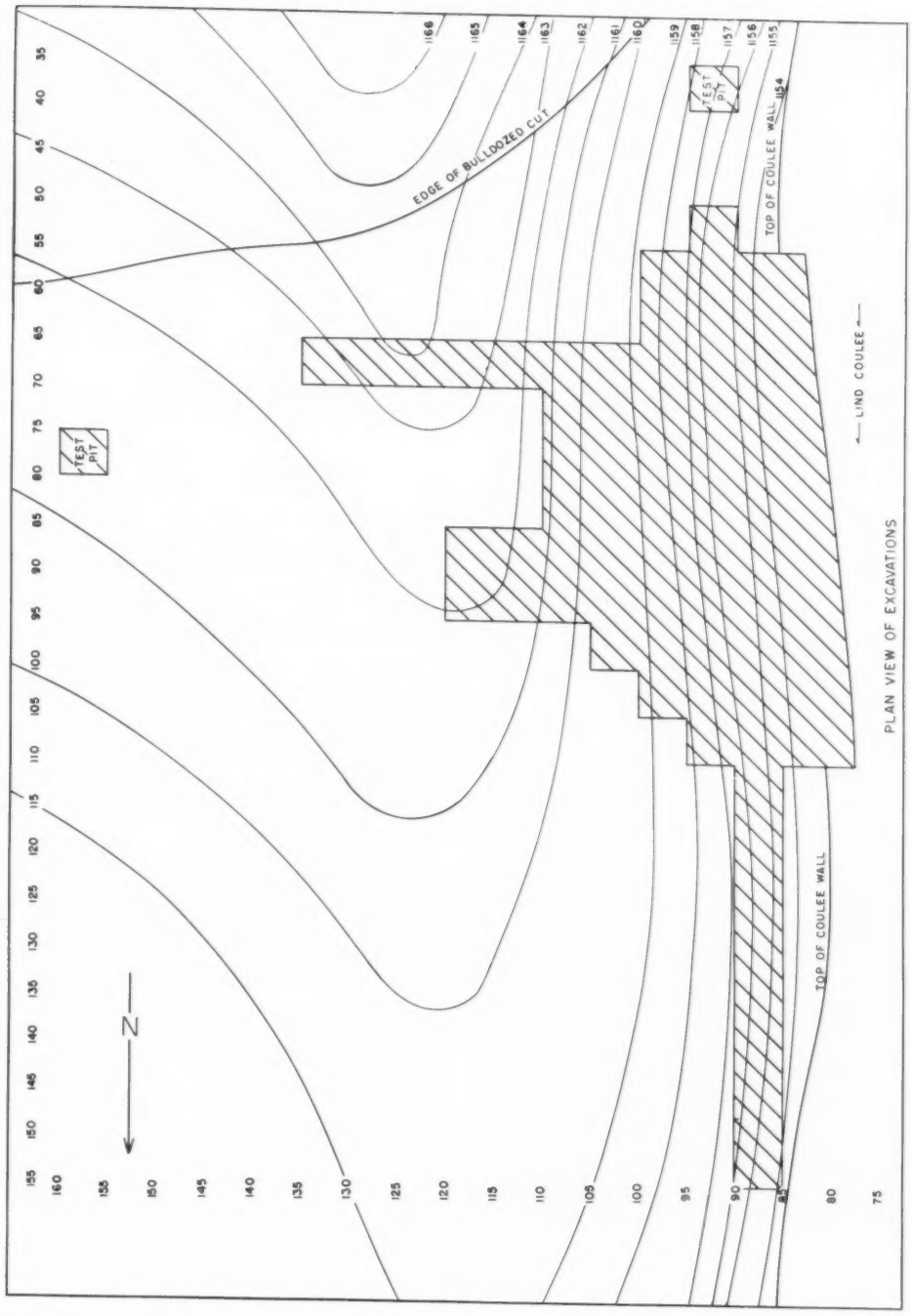

EDGE OF BULLDOZED CUT
TEST PIT
TEST PIT
TOP OF COULEE WALL
TOP OF COULEE WALL
← LIND COULEE ←
PLAN VIEW OF EXCAVATIONS
N

FIG. 6.

Normally during excavation two men were assigned to a 5-foot square. At first, arbitrarily established 0.5-foot levels were excavated until the underlying sterile sands were reached. When it was later determined that slight concentrations of the cultural materials occurred at certain levels, the unit levels were shifted to accommodate the levels of concentration. Although compacted into an extremely hard mass throughout most of the site, the sands and silts could be passed through a one-quarter-inch mesh screen without too great difficulty. The most common practice was for one man, using a sharp, square-point shovel, to slice a thin layer from the surface and deposit it in the screen where the second man would break up the clods and trowel the material through the screen into a wheelbarrow. The coulee served as a convenient dumping place for the screened sand. The deposits were much too hard for a trowel to be used for anything but the fine work of removing specimens, etc. This method proved to be the most rapid and at the same time the most careful that could be devised.

A level-bag was kept for each unit level, in which all cultural debris, such as flakes and bone fragments, was placed. Standard field forms were used for recording all data.

An Exacta 35 mm. camera was used for progress and color photographs, and a $3\frac{1}{4}'' \times 4\frac{1}{4}''$ Graflex camera was employed where fine detail was desired. In all, nearly 1,000 photographs recorded the excavation of the Lind Coulee Site.

Laboratory Methods

In addition to the usual cleaning, repairing, and cataloging of specimens, the contents of each of the level-bags was separated on the basis of material, the number of fragments of bone and stone, etc., counted, and the total in each category weighed. Because the artifact yield was not high, and the stratigraphy poorly defined, this information was extremely valuable in determining the areas of greatest concentration and in helping to define the stratigraphy.

Methods of Typological Analysis

A great deal of confusion is encountered in the concept and definition of a *type*. This writer is in basic accord with Krieger's usage of the term (Krieger, 1944: 271–288). Krieger insists that

> . . . the purpose of a type in archaeology must be to provide an organizational tool which will enable the investigator to group specimens into bodies which have *demonstrable historical meaning in terms of behavior patterns* (*ibid.*, 272).

A slight refinement of this typological concept has been employed in the analysis of the cultural materials. The term *form* will refer to any single artifact, the emphasis being placed on its diagnostic formal characteristics. If a *form* is found to recur with some regularity and, as such, may have additional cultural significance, it is also designated a *style*. When the temporal, spatial, and relational factors (i.e., historical factors) for a given style have been determined, such a style will then be given a *type* designation.

One caution should be observed. The application of these terms must not be so rigid as to exclude a range of individual variation. As Krieger correctly insists

> In all study of behavior it is essential to distinguish between the traditional or ideal pattern and the actual enactments which result from individual variability in skill, interest, or effectiveness (*ibid.*).

STRATIGRAPHY

The following is the writer's interpretation of the strata of the site based upon the stratigraphy as recorded from the various profiles, and relying to a large extent on the interpretations of Campbell, Culver, and Nering. The discussion will proceed in order from the lowermost to the uppermost stratigraphic unit.

Basalt Bedrock.—Lind Coulee has incised its way down to and into the uniform basement of Miocene basalt which is one of the most outstanding features of the geology of the Columbia Basin. Where exposures of basalt may be observed along the coulee floor, the smoothed and rounded surface gives evidence of the erosive action of the waters flowing down the coulee, and perhaps also of the former existence of lakes.

Bed F.—Upon the bedrock of Miocene basalt occurs several feet of sand, gravel, and angular cobbles. This material is almost entirely of basalt, with a few granitic cobbles included. No deposits of granite are known to occur locally, the nearest exposures lying sixty miles or more to the north.

Bed E.—Bed E exhibits the typical appearance of the Touchet deposits in texture and in the occurrence of clastic dikes (see fig. 7). The Touchet deposits are generally thought to be of proglacial origin, probably formed during the Mankato period (Lupher, 1944: 1460). Bed E is significant

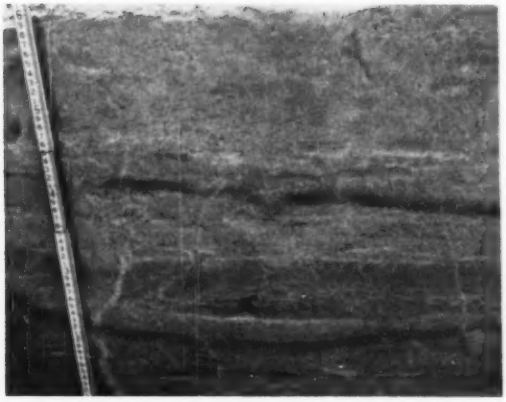


FIG. 7. Clastic dikes of Touchet beds (Bed E).

because it gives a maximum possible age of approximately 11,000 years for the beds containing the cultural material, Bed D.

Bed D.—This unit consists of up to 8 feet of evenly bedded, firmly compacted, water-laid sand, containing artifacts and cultural debris. It reaches its greatest depth along the coulee wall where it may be observed resting directly on Bed F, but to the east it thins perceptibly as it overrides Bed E. It may be that this sand was derived from reworking Touchet Bed E. Bed D has an even dip to the northwest. As the geologists have pointed out, the characteristics of the bed indicate its deposition either in a sluggish stream or a lake. An occasional rounded cobble may be found within the otherwise uniform fine sand deposits. Some of these were no doubt brought to this locality by man, but others were observed at depths below the cultural horizon, and some other agency, perhaps ice-rafting, must have been responsible. At one point in Bed D, two large, rounded boulders which weighed an estimated 500 pounds each, were encountered during the excavation (see fig. 9). The boulders were oblong and were observed to be standing on end, held in this position by the surrounding sand. At the base of these rocks several smaller boulders were found. The base of the boulders was several feet below the lowest cultural materials, but their tops extended into the cultural horizon. If we concede that it was a sluggish stream or lake that was responsible for the fine, evenly bedded sands of Bed D, then one agency, floating ice, was probably responsible for the occurrence of these boulders. With Bed E, the Touchet deposits, being formed during a proglacial period, it appears that the lowermost levels of Bed D were deposited not long after, when floating rafts of ice carrying rocks were still common.

The cultural horizon is over 2 feet thick and occurs above the center of Bed D. Neither the color nor the texture of this horizon differentiated it from the rest of Bed D. The scattered cultural debris showed no significant stratigraphic sequence.

A number of the stone flakes and a few artifacts were observed to be lying in the sand in a tilted position as if they had been dropped on soft sand. It appears probable from the analysis of the deposits and the situation of the artifacts and cultural debris contained therein, that we are dealing with a campsite which was situated on the shore of a sluggish stream or lake. Seasonal camping on the soft beach sands, along with the possible yearly inundation of the locality during periods of high water, combined to arrange the present distribution of the cultural material.

Radiocarbon analysis of fragments of burned bison bones from the cultural horizon has given a weighted average age of 8,700 plus or minus 400 years. (Radiocarbon analysis of the sample was made by Dr. W. F. Libby of the Institute for Nuclear Studies, University of Chicago, and bears the sample number 827.) It will be noted that this age correlates very well with the dating estimate of approximately 11,000 years for the underlying Touchet deposits (Bed E), and the overlying Bed B which contains lenses of volcanic ash estimated to date from around 6,000 years ago.

One question concerning the occurrence of cultural materials in Bed D could be fairly asked: "Is the occurrence of the cultural material at this locality due to its use as a campsite, or were the materials washed in from some point of original deposition?" All evidence points to the use as a campsite as the most probable explanation. Areas of charcoal-blackened earth, articulated bones, and the finding of a handstone next to a grinding stone for pigment, all argue against the "washing-in" theory.

After the abandonment of the site by man, more than a foot of sterile Bed D sands accumulated over the cultural horizon before this depositional period was brought to a close. Then followed a period of exposure and erosion of the surface of Bed D, leaving an unconformity between this stratum and the next.

Bed C.—Resting unconformably on the surface of Bed D are scattered lenses of coarse sand and

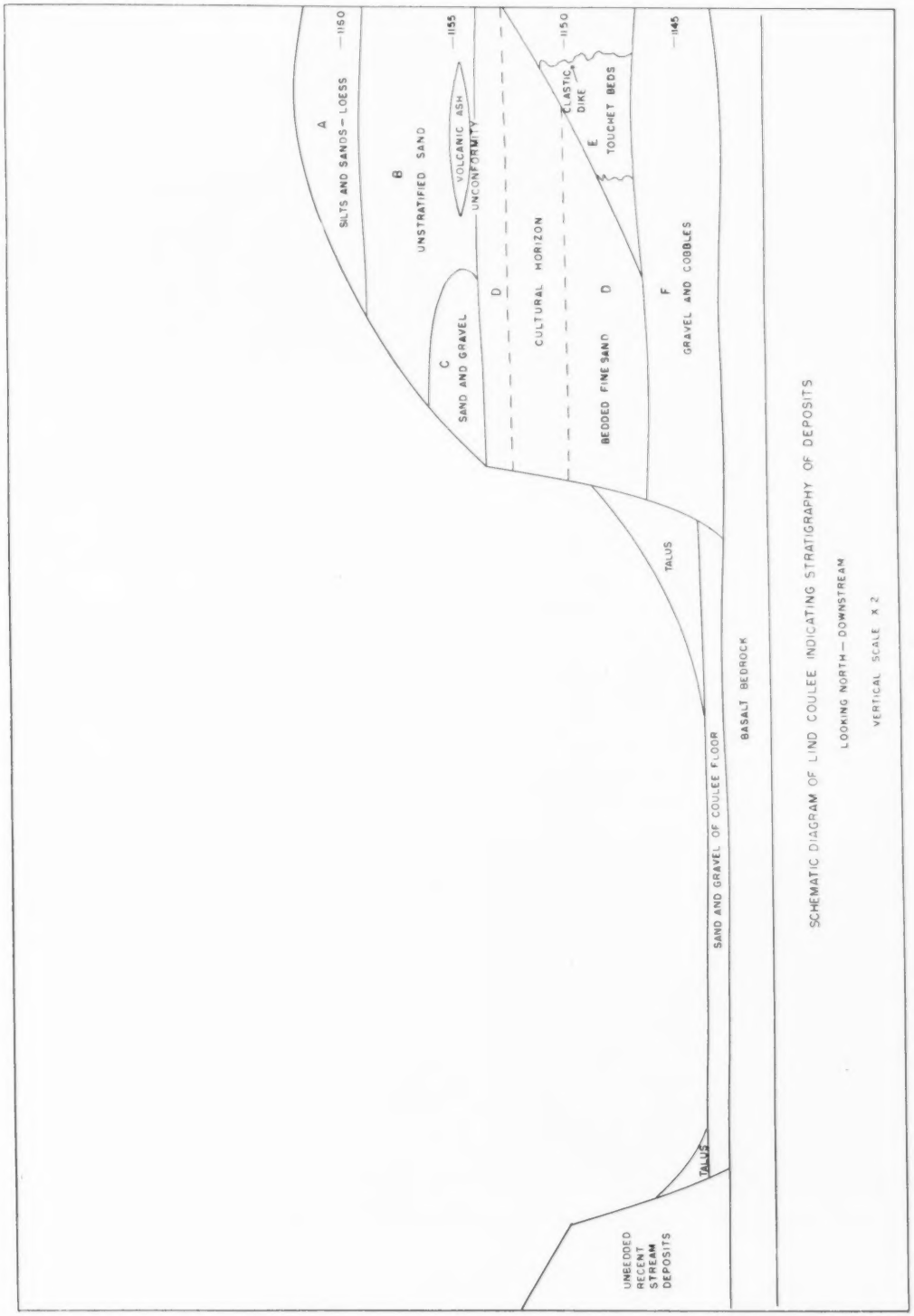

A
SILTS AND SANDS — LOESS
1150
B
UNSTRATIFIED SAND
VOLCANIC ASH
1155
UNCONFORMITY
C
SAND AND GRAVEL
D
CULTURAL HORIZON
BEDDED FINE SAND
CLASTIC DIKE
1150
E
TOUCHET BEDS
F
GRAVEL AND COBBLES
1145
TALUS
SAND AND GRAVEL OF COULEE FLOOR
BASALT BEDROCK
UNBEDDED RECENT STREAM DEPOSITS
TALUS
SCHEMATIC DIAGRAM OF LIND COULEE INDICATING STRATIGRAPHY OF DEPOSITS
LOOKING NORTH — DOWNSTREAM
VERTICAL SCALE X 2

FIG. 8.

gravel, occupying a stream meander scar in the bed's surface.

Bed B.—Resting on the eroded surface of Bed D is a layer of unstratified silt and fine sand of loessial origin. This varies from 3 to 5 feet in thickness. Scattered throughout this stratum are lenses and pockets of moderately pure volcanic ash. Apparently large quantities of volcanic ash were being blown about during the deposition of Bed B. Hansen has indicated from evidence in pollen profiles that the period around 6,000 years ago was one of great volcanic activity (Hansen, 1947: 38). No evidence exists for a period of marked volcanic activity in the Cascade Mountains since that time. If the ash in Bed B may be attributed to the period of vulcanism around 6,000 years ago, this provides us with a minimum date for the deposition of Bed D and its inclusive cultural materials. On the basis of geological evidence we can state that man occupied the Lind Coulee Site at some time during the period between 11,000 and 6,000 years ago, with radiocarbon analysis assigning an age of 8,700 plus or minus 400 years.

Bed A.—This, the uppermost stratum of the deposits, consists of lighter colored silts and sands of windblown origin. It is this surface layer which supports the sparse semidesert vegetation. At several points along Lind Coulee the writer has observed indication of recent Indian camp sites on and in this surface material.

ANALYSIS OF MATERIAL CULTURE

Because of the depth of the cultural horizon from the surface, and the general paucity of artifacts in the cultural horizon, the total number of artifacts recovered from the Lind Coulee Site was not large. Only 186 artifacts were recovered in the removal of nearly 600 cubic yards of earth. Two seasons of excavation have by no means exhausted the site; in fact, all evidence suggests that the artifact yield was increasing as the excavations progressed in a northeasterly direction. It is now evident that the original exposure of artifacts and debris along the coulee wall occurred near the southernmost extent of the site. The present channel of the coulee has removed, to an unknown extent, the site's western margin. In the course of the excavations it was observed that the cultural deposits thinned perceptibly and finally disappeared as the culture-bearing sands overrode the underlying Touchet deposits along the eastern edge of the site. The excavations did not reach the site's northern border, but the occurrence of a sharp downward dip of the culture-bearing sands exposed along the coulee wall suggests that the site probably does not extend more than 30 feet beyond the northernmost point reached by the excavations.

FIG. 9. Ice-rafted boulders in culture-bearing sands.

FIG. 10. View of east coulee wall just south of site locality.

On the basis of the non-stratified occurrence of the artifacts, we must consider the cultural horizon as a single unit. This interpretation is supported by an analysis of the various artifact forms.

The material culture of the Lind Coulee Site is represented only by artifacts of stone and bone. The nature of the deposits is such as to work against the preservation of more perishable items.

FIG. 11. Aerial view of site at end of second season's excavation.

IMPLEMENTS OF STONE

On the whole, the stone artifacts from the Lind Coulee Site are well made, indicating that their makers possessed a rather high degree of skill in stone-flaking techniques. Both percussion and pressure-flaking techniques were freely employed.

Nearly all of the stone implements were fashioned from fine-grained stone material. Table 2 indicates the types of stone utilized, and the percentage of artifacts in each category. In addition to the materials listed, a number of small pieces of worked red pigment (hematite) were found.

TABLE 2

MATERIALS USED IN THE MANUFACTURE OF STONE IMPLEMENTS

Material	Per cent
Chalcedony	66
Semi-opal	17
Opal and Chalcedony	6
Basalt	6
Opal	3
Jasper	1
Granite	0.5
Semi-opal and Chalcedony	0.5
	100.0

All of these types of stone are available within a distance of twenty miles from the site locality. Basalt is everywhere available in the Columbia Basin region. Granite, while not occurring in outcrops locally, is present in the form of cobbles and boulders, brought into the region as outwash debris during glacial times. The remainder of the types of stone is to be found in large and small masses in the Miocene basalts. This material is especially abundant in areas of pillow lavas, in vesicles in the basalt flows which have been filled with the silica minerals, opal and chalcedony, and in the region of the middle Columbia where the silicified trunks of Miocene trees are abundant in the lava flows.

I. Flaked Stone Implements

The flaked stone implements have been divided into two categories, those that exhibit edges along which flakes have been removed from one face only, termed *single-bevel* forms, and those implements whose edges have been formed through the removal of flakes from both faces, called *double-*

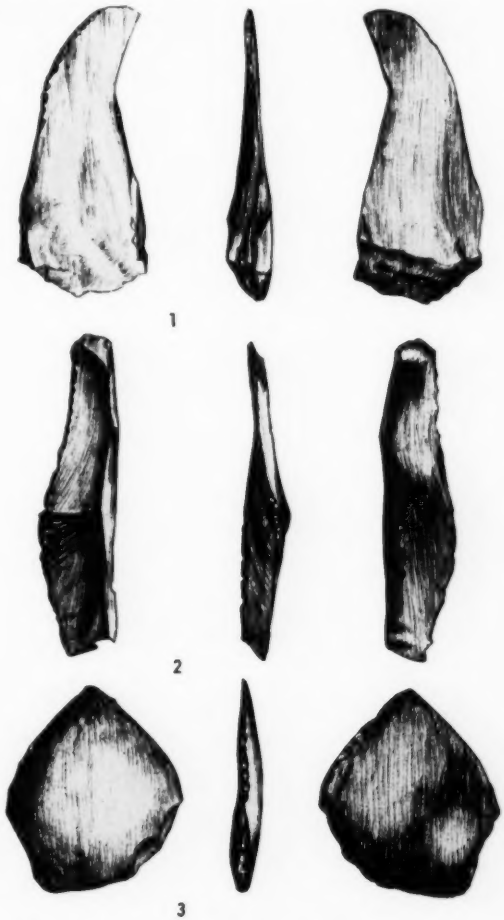


FIG. 12. Irregular, thin flake side scrapers, *Style 1*. 1, 70 mm. in length.

TABLE 3

CLASSIFICATION OF STONE IMPLEMENTS

Category	No. of spec.	Illustrations	Weights (grams)			Form, style, or type
			Min.	Max.	Mean	
I. Flaked Stone Implements						
A. Single-bevel edges	127					
1. Side scrapers	93					
a) Thin flake						
1) Irregular	67	fig. 12, nos. 1, 2, 3 fig. 14, nos. 1, 3, 10, 11, 12, 13, 17, 18	3.0	54.2	7.8	Style 1
2) Oval	6	fig. 13, nos. 1, 2 fig. 16, nos. 1, 8	6.5	35.1	19.4	Style 2
b) Thick flake						
1) Irregular	6	fig. 14, no. 16	58.2	217.2	71.1	Style 3
2. End scrapers						
a) Elongate	2	fig. 13, no. 3 fig. 16, nos. 7, 9	21.2	38.9	30.1	Style 4
b) Oval						
1) Keeled	6	fig. 15, nos. 1, 2 fig. 16, nos. 2, 5, 12, 13	33.6	78.7	58.7	Style 5
2) Domed	8	fig. 15, no. 3	43.3	60.0	56.7	Style 6
3. Concave scrapers	14	fig. 14, nos. 4, 7, 8, 9 fig. 17, nos. 2, 3	2.5	17.5	7.3	Style 7
4. Flake knives	17	fig. 14, nos. 2, 5, 6, 14, 15 fig. 17, no. 1	3.3	30.0	14.3	
5. Gravers	1	fig. 21, no. 3 fig. 22, no. 2*c*	13.6	13.6	13.6	
B. Double-bevel edges	32					
1. Projectile points and fragments	21					
a) Stemmed	6					
1) Tapered stem						
(*a*) Rounded shoulders						
(1) Convex base	2	fig. 18, nos. 4, 5 fig. 19, no. 3	7.3	7.3	7.3	Style 1
(*b*) Sharp lateral shoulders						
(1) Convex base	3	fig. 18, nos. 2, 3, 6 fig. 19, nos. 1, 2 fig. 20, no. 2	5.0	7.6	6.3	Style 2
2) Parallel-sided stem						
(*a*) Sharp lateral shoulders						
(1) Convex base	1	fig. 18, no. 1 fig. 20, no. 1	9.6	9.6	9.6	Form only
b) Nonstemmed						
1) Leaf-shaped						
(*a*) Backward projecting barba						
(1) Concave base	1	fig. 18, no. 10 fig. 20, no. 4	Fragmentary			Form only
2. Crescentic blades	2	fig. 21, nos. 1, 2 fig. 22, nos. 2*a*, 2*b*	8.8	8.8	8.8	Type
3. Knives	6		12.8	26.2	19.5	
4. Choppers	3	fig. 23, no. 1 fig. 24, no. 3	171.7	936.8	461.8	
II. Ground Stone Implements						
A. Ground surface developed through use	22					
1. Palettes	2	fig. 23, no. 2 fig. 24, no. 2	908.3	908.3	908.3	
2. Hand stones	4	fig. 24, nos. 1, 4	276.0	741.5	604.2	
3. Pigment	16					

bevel forms. The functional nature of these basic differences in form seems to warrant this distinction.

A. Single-bevel edges.—Artifacts that are included in this category are mainly those whose function appears to have been that of scraping or incising. Side scrapers, end scrapers, and gravers are found in this group. A number of artifacts termed flake knives are also included here. These forms may be distinguished from the scrapers on the basis of their low angle of retouch. This distinction may be more apparent than real, but because of the low angle of retouch, these implements would have been as serviceable as knives as those knives exhibiting double-bevel edges.

1. Side scrapers.—The implements identified as side scrapers have been divided into two groups, thick and thin. On the basis of the subcategories that may be recognized under each of these headings, this distinction appears warranted even though the point at which the division must be made seems somewhat arbitrary.

a) Thin flake side scrapers. Thin flake side scrapers are those whose maximum thickness does not exceed 12 mm., with the average for the group approximating 5 mm. On the basis of their outline form, the thin flake scrapers have been divided into two subcategories, irregular and oval.

1) Irregular thin flake side scrapers (fig. 12, nos. 1, 2, 3; fig. 14, nos. 1, 3, 10, 11, 12, 13, 17, 18). Numerically, this group forms the largest category of stone implements. Irregular thin flake side scrapers were found throughout the cultural horizon. The fact that obviously no attempt had been made to alter the gross shape of the flakes in the manufacture of these implements serves as their identifying characteristic. These scrapers are the least specialized of all of the stone tools, and they are therefore of little diagnostic value in making cultural comparisons. Because this form of scraper is represented by a number of specimens, it will be designated *Style 1*. Style 1 scrapers were fashioned by detaching a flake by percussion from a parent block of stone and then retouching one or more edges by pressure flaking methods. On those specimens with more than a single retouched edge, the retouching of the various edges may be on opposite faces. The retouching of the edges on several specimens appears to have been accomplished through use rather than purposeful pressure flaking. In shape, the working edges of *Style 1* scrapers may be straight or convex. The angle of retouch varies from 40 to 75 degrees. These implements range in size from 12 mm. to 99 mm. Chalcedony, opal, semi-opal, opal and chalcedony, and basalt have been used in the manufacture of these scrapers.

FIG. 13. Oval, thin flake side scrapers: 1, 2, *Style 2*. End scraper: 3, *Style 4*. 1, 59 mm. in length.

2) Oval thin flake side scrapers (fig. 13, nos. 1, 2; fig. 16, nos. 1, 8). Implements belonging to this category may be distinguished from the *Style 1* scrapers by their oval shape, continuous retouching at least two-thirds of the way around the edges, and the abrupt angle of retouch. These scrapers are designated *Style 2*. In size, the *Style 2* scrapers vary from 34 mm. to 70 mm., with the thickness varying from 4 mm. to 8 mm. The flaking techniques employed in their manufacture are the same as for *Style 1*. The shape of the working edge is convex. Five of the specimens are made of chalcedony and one is made of semi-

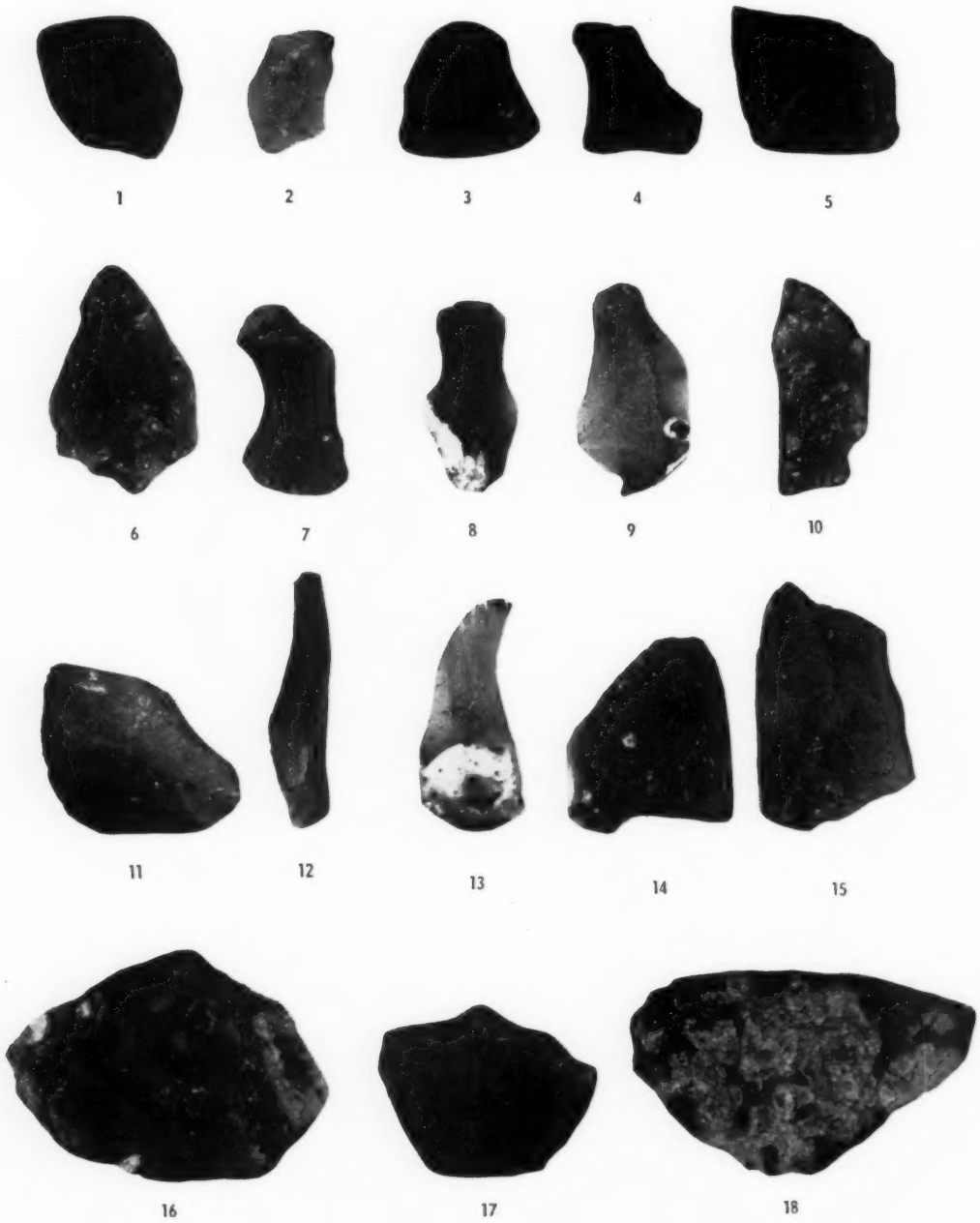


FIG. 14. Side scrapers and flake knives. *Style 1:* 1, 3, 10, 11, 12, 13, 17, 18; *Style 3:* 16; *Style 7:* 4, 7, 8, 9; flake knives: 2, 5, 6, 14, 15. 1–7, 10–12, 14–18, chalcedony; 8, opal; 9, 13, opal and chalcedony. 13, 70 mm. in length.

opal. Examples of *Style 2* scrapers were found at all levels in the cultural horizon. These scrapers have a rather symmetrical appearance; the under side is flat and smooth, and the upper side, while nearly flat, exhibits a number of percussion flaking scars and uniformly pressure-flaked edges.

In terms of the diagnostic value of *Style 2* scrapers, their wide distribution in early and recent sites makes them of little value as an indicator of specific cultural relationships.

b) Thick flake side scrapers. Side scrapers in this category vary in thickness from 16 mm. to 31 mm.

1) Irregular thick flake side scrapers (fig. 14, no. 16). This category of scrapers, which may be identified as *Style 3* scrapers, differs from the irregular thin flake side scrapers of *Style 1* in a number of respects. They are generally of a larger size, ranging from 50 mm. to 91 mm. in length, and because of their greater thickness, which varies from 16 mm. to 25 mm., the angle of retouch is somewhat greater. In the six specimens of *Style 3* scraper recovered, the angle of retouch ranged from 52 to 81 degrees. Several resemblances between the *Style 3* and *Style 1* scrapers may be observed. Both percussion and pressure flaking methods were usually employed in the manufacture of both styles. One specimen of *Style 3* was found, however, to have been fashioned through percussion flaking only. Both styles may have more than one working edge, and when this occurs, the retouching may be on opposite faces. Again, both styles indicate that the original gross shape of the flake had not been altered except to retouch the edge(s). In terms of their vertical distribution, the *Style 3* scrapers occurred uniformly throughout the cultural horizon. Four of the *Style 3* scrapers are of chalcedony, the other two being opal.

2. End scrapers. Two main categories of end scrapers, the elongate and oval, occur at the Lind Coulee Site. The principal difference between the two is that of shape. Those classified in the oval category are definitely egg-shaped in outline, while the elongate style lacks this distinctive characteristic, has a greater length relative to width, and is much less regular in form.

a) Elongate (fig. 13, no. 3; fig. 16, nos. 7, 9). Though few in number, this category of scrapers appears to have sufficient stability to qualify as a distinctive style, and is therefore designated *Style 4*. These are elongated scrapers with a length ranging from 56 mm. to 82 mm., and the width varying from 36 mm. to 38 mm. The working edge is at one end; the angle of retouch varies from 68 to 72 degrees. Both percussion and pressure flaking methods were employed in their shaping. Two types of stone, chalcedony, and chalcedony and opal, were used for these scrapers. Like other scrapers styles, *Style 4* scrapers are so widely distributed in early and recent sites that one can only record their presence or absence.

b) Oval end scrapers. This group of scrapers

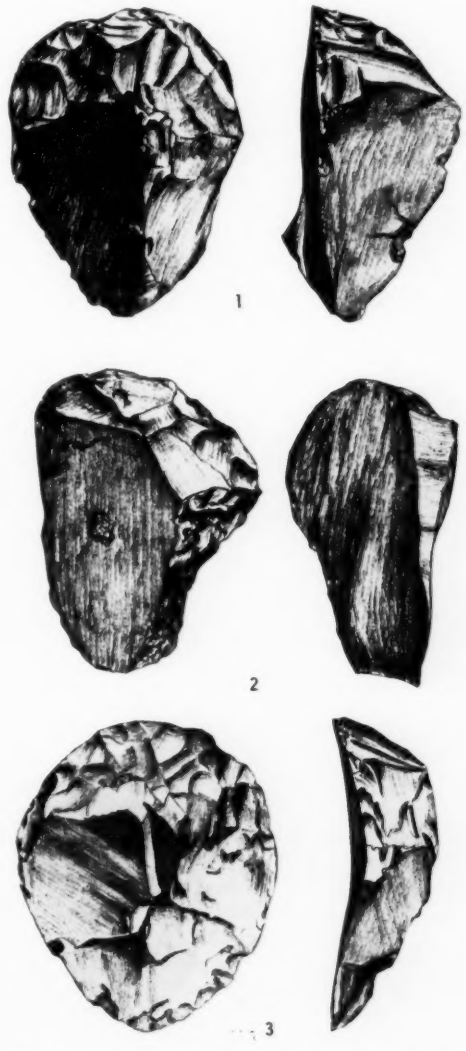


FIG. 15. Keeled end scrapers: 1, 2, *Style 5*. Domed end scraper: 3, *Style 6*. 1, 64 mm. in length.

is identified by the purposely-shaped oval form. They may be distinguished from *Style 4* scrapers not only on the basis of their oval shape, but also by their keeled or dome-shaped upper surface. The flaking scars along the working edge are uniformly on one surface only, the upper surface.

1) Keeled (fig. 15, nos. 1, 2; fig. 16, nos. 2, 5, 12, 13). Designated *Style 5*, these scrapers are identified by the distinct keel or ridge which runs longitudinally along the upper surface. The under surface is flat to slightly concave. The five specimens of this style recovered were manufactured entirely by percussion flaking methods. It is not certain whether the minute percussion flaking scars along the very margin of the working edge are the result of intentional flaking or were developed through use. From above, these scrapers are egg-shaped in outline, the broad end carrying the working edge which extends to the point of greatest width. The length ranges from 61 mm. to 65 mm., the width from 45 mm. to 57 mm. The face of the working edge is quite abrupt, the angle of retouch ranging from 65 to 83 degrees. Three of the *Style 5* scrapers were of chalcedony, the other two of semi-opal. An analysis of their vertical distribution finds them occurring throughout the cultural deposit.

The keeled oval thick flake scrapers, identified as *Style 5*, are often included in the category "snub-nosed" scrapers by various authors. While the "snub-nosed" scrapers have a wide distribution in recent as well as early sites, the truly "keeled" specimens appear to be limited to sites with some antiquity. Scrapers nearly identical to our *Style 5* were found at the Lindenmeier Site (Roberts, 1935: pl. 9, *b, c, h*). However, it is probable that one should not assign too great weight to these scrapers for purposes of cultural comparison because of the wide range of variations on this basic theme.

2) Domed (fig. 15, no. 3; fig. 16, nos. 3, 4, 10, 11, 14, 15). Though differing slightly in appearance from the *Style 5* keeled scrapers, the domed scraper, designated *Style 6*, appears to be functionally the same implement. The *Style 6* scrapers range from 23 mm. to 69 mm. in length, and from 17 mm. to 61 mm. in width. With the exception of one specimen, the size ranges are nearly the same as for the *Style 5* scrapers. The *Style 6* scrapers have a generally more rounded shape than those of *Style 5*. The under surface tends to be flat or slightly concave, while the upper surface has a rounded to dome-shaped appearance. One specimen (fig. 15, no. 3; fig. 16, no. 14) has an upper surface intermediate in appearance between the *Style 5* and *Style 6* scrapers, possessing slight indications of a keel. This may indicate that while no functional difference existed between the two styles, definite preferences in form were expressed. The angle of the working edge is quite abrupt, ranging from 56 to 85 degrees. Though the angle of retouch is approximately the same as that of the *Style 5* scrapers, the working edge of *Style 6* covers over two-thirds of the periphery. Pressure as well as percussion flaking was used in the manufacture of the specimens. All of the examples of *Style 6* scrapers are made of chalcedony. All but one of the specimens were found at the top of the cultural horizon, the exception coming from a point near the middle.

Style 6 scrapers are less diagnostic than *Style 5*, fitting well within the category of "snub-nosed" scrapers from many early as well as recent sites.

3. Concave scrapers (fig. 14, nos. 4, 7, 8, 9; fig. 17, nos. 2, 3). A number of scraping implements have been assigned to this category on the basis of having one or more working edge which is concave in shape. One difficulty is encountered in the classifying of this group of implements; whereas all specimens have the identifying concave working edge(s), several have an additional working edge which is convex in shape and would fit into one of the other categories with equal ease. The irregular gross shape of these scrapers, which are designated *Style 7*, indicates that only the working edge received special attention. These scrapers range in thickness from 5 mm. to 12 mm. The range in size is from 22 mm. to 70 mm. in length. The flakes had been detached from the parent block of stone by percussion flaking, with pressure flaking having been used to shape the working edge(s). The angle of retouch of the working edge varies from 36 to 66 degrees. *Style 7* scrapers tended to concentrate in the middle and upper levels of the cultural stratum. Chalcedony, semi-opal, opal and chalcedony, and opal were used in the manufacture of these implements.

Two of the specimens found are elongated flakes with opposing concave working edges (fig. 14, nos. 7, 8; fig. 17, nos. 2, 3). Scrapers closely resembling these and identified as "spokeshaves" are listed by Rogers as belonging to Phase II of the Playa Industry of southern California (Rogers, 1939: 33, pl. 8). (See also fig. 22, no. 1 of this paper for reproduction of Roger's plate 8). It is doubtful, however, whether opposing concave edges are more significant than a concave edge opposite a convex edge, or even a single concave

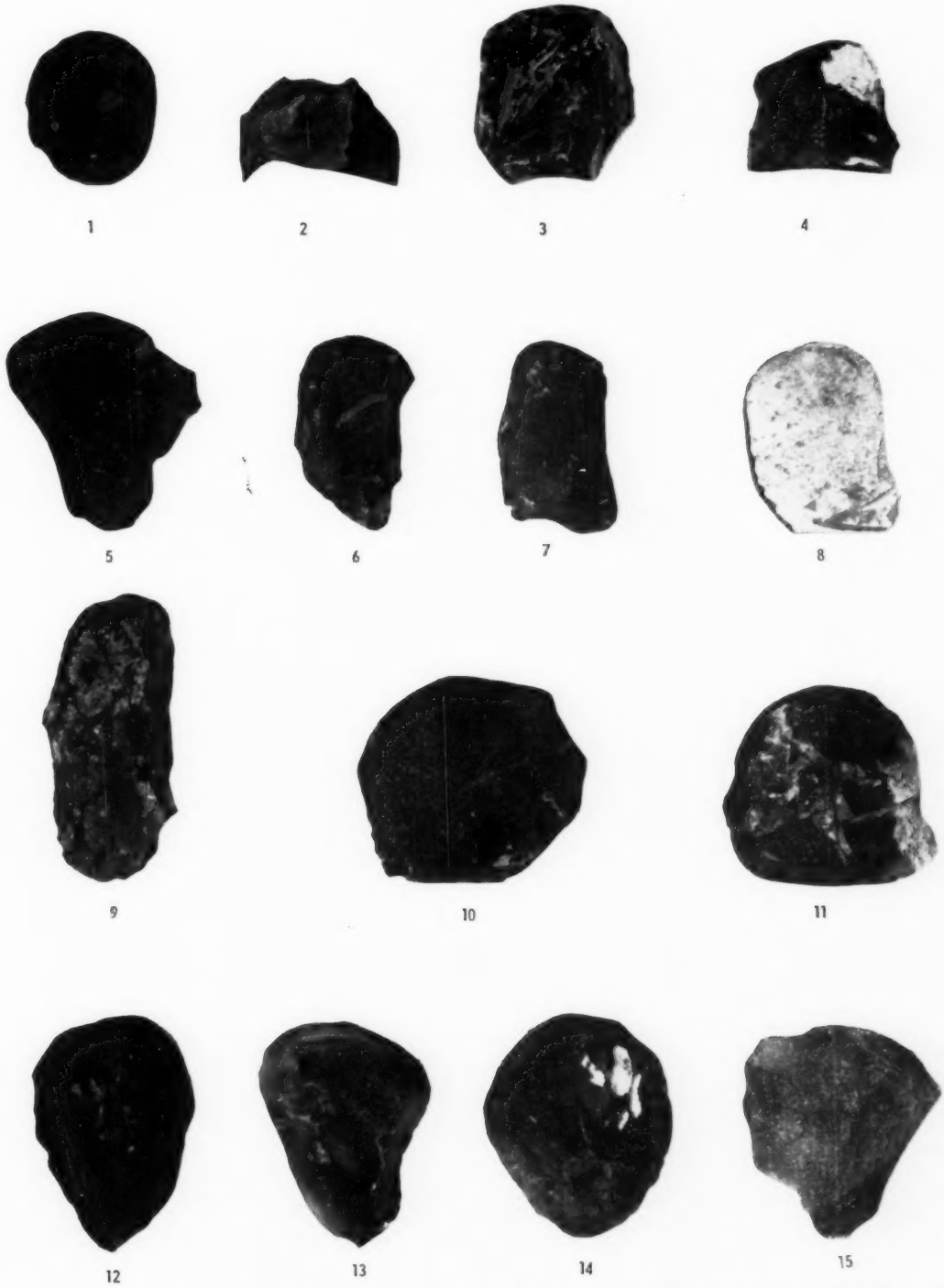


FIG. 16. Side scrapers and end scrapers. *Style 2*: 1, 8; *Style 4*: 7, 9; *Style 5*: 2, 5, 12, 13; *Style 6*: 3, 4, 10, 11, 14, 15; *Style 7*: 6. 3–8, 10, 11, 13–15, chalcedony; 9, chalcedony and opal; 1, 2, 12, semi-opal. 8, 59 mm. in length.

FIG. 17. Flake knife: 1. Concave side scrapers; 2, 3. 1, 62 mm. in length.

edge. This category of scrapers, too, is probably without much diagnostic value because of its generalized nature.

4. Flake knives (fig. 14, nos. 2, 5, 6, 14, 15; fig. 17, no. 1). As previously indicated, this category of implements is differentiated from the *Style 1* scrapers on the basis of the angle of retouch, which, on the flake knives, ranges from 22 to 35 degrees. Like the *Style 1* scrapers, no attempt has been made to alter the natural shape of the flake, more than one edge may show signs of retouching, and the edges are straight or convex in shape. The flake knives vary from 2 mm. to 16 mm. in thickness, and from 12 mm. to 80 mm. in length. Chalcedony, chalcedony and opal, semi-opal, and jasper were used for these implements. These implements were found evenly distributed through the cultural stratum. Both percussion and pressure flaking methods were used in the fashioning of these tools.

As is the case with the *Style 1* scrapers, the flake knives lack sufficient diagnostic value to be of use in making cultural comparisons.

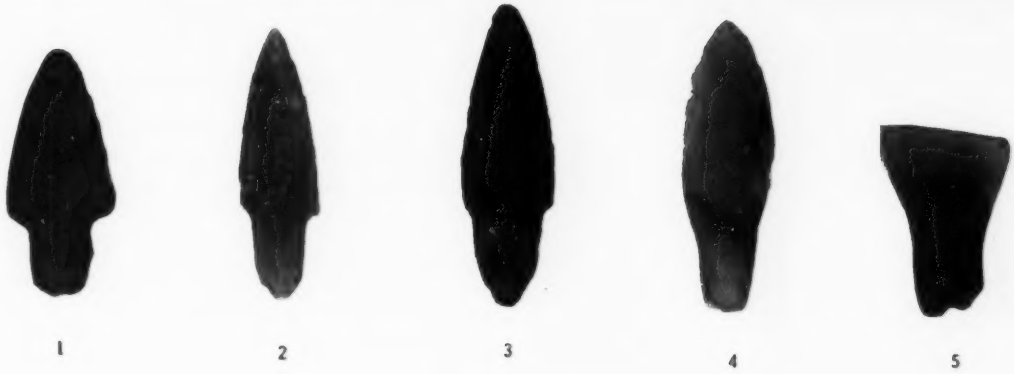
5. Graver (fig. 21, no. 3; fig. 22, no. 2*c*). A single implement identifiable as a graver was found at the top of the cultural stratum. This graver appears to have been a multi-purpose tool. Along one side two concave scraping edges are separated by the graving projection. The opposite side gives the appearance of a well-made flake scraper with a slightly convex working edge. The angle of retouch is 50 degrees for the concave edges, and 35 degrees for the convex edge. The graver is 52 mm. long, and 41 mm. wide, with a maximum thickness of 5 mm. The under surface is flat and slightly concave, while the convex upper surface carries several percussion flaking scars. Pressure flaking was used to prepare the working edges. The material is semi-opal.

Gravers occur widely in early horizons in North America, but they also occur in more recent cultural periods as well. The form represented here resembles closely the gravers from the Lindenmeier site (Roberts, 1935: pl. 13; Roberts, 1936: pl. 9), but on the basis of a single specimen it is dangerous to generalize too widely in making specific cultural comparisons.

B. Double-bevel edges. Artifacts included in this category are those whose function appears to have been piercing, cutting, and chopping. Projectile points, crescentic blades, knives, and choppers are found in this category. With the exception of the choppers, one characteristic of this group is that the original surface of both faces has been entirely obliterated by secondary flaking.

1. Projectile points and fragments. Of the twenty-one projectile points found distributed evenly throughout the site, only seven are sufficiently complete to be useful for purposes of classification. Of the remainder, seven fragments are from the tips of blades, one from the mid-section, and six from the base ends of points. A comparison of the average size of the Lind Coulee points with that of points from recent sites in the Columbia Basin finds the Lind Coulee points to

FIG. 18. Projectile points and fragments of broken specimens. *Style 1:* 4, 5; *Style 2:* 2, 3; *Style 3:* 1, 6; concave base form: 10; large spear point or knife (broken): 15. 6, 9, 11, 12, 16, basalt; 3, 4, 7, 8, 13, 15, 17, chalcedony; 1, 14, jasper; 2, 10, opal; 5, opal and chalcedony; 18, 20, semi-opal. 3, 70 mm. in length.



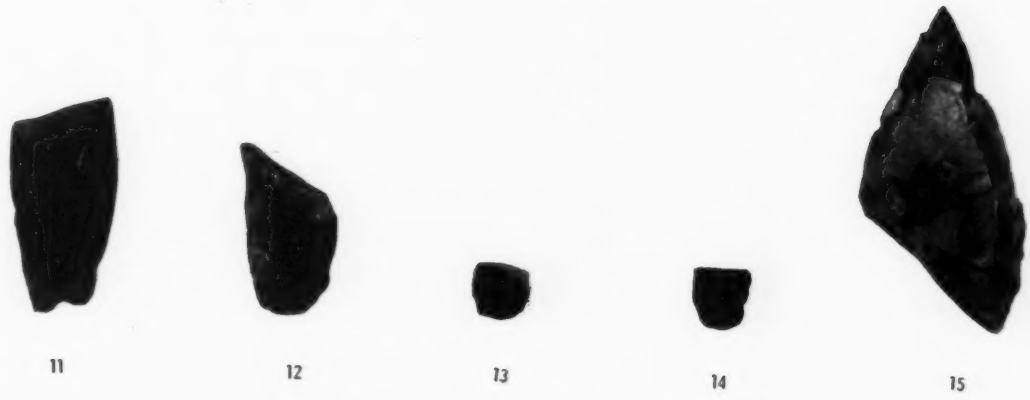


FIG. 18

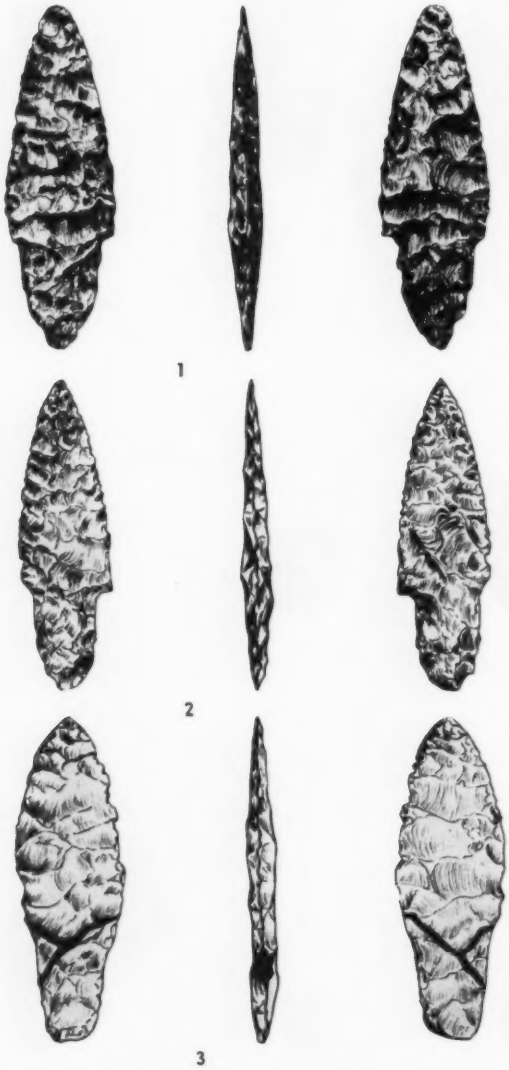


FIG. 19. Projectile points. 1, 2, *Style 2*; 3, *Style 1*. 1, 70 mm. in length.

be noticeably larger. While crude examples occur in the collection of points from Lind Coulee, a number of specimens indicate that their makers could fashion excellent projectile points.

a) Stemmed projectile points. Twelve of the twenty-one projectile points and fragments can be identified as being stemmed. Ten of them possess a slight taper to the stem, while the stem of one appears to be parallel-sided. In all complete examples of stemmed points, the length of the stem constituted one-third of the total length of the point. Two basic styles of tapered stem points can be recognized.

1) Tapered stem. Style 1 (fig. 18, nos. 4, 5; fig. 19, no. 3). Two specimens, one complete and the other fragmentary, identify this style. Both points are chalcedony. The broken specimen (fig. 18, no. 5) in its complete form would be much larger than the other. Both possess the identifying characteristics of tapered stem, rounded shoulders, and convex base. The complete specimen is rather long and slender in shape. The length is 66 mm., the maximum width 21 mm., and the maximum thickness 4 mm. The maximum thickness of the fragmentary specimen is 6 mm. The sharp edges of the stem of the fragmentary point have been ground smooth, but no indications of this can be found on the complete specimen. Both percussion and pressure flaking methods were used in the shaping of these points. The flaking scars indicate pressure flaking for the final shaping. In some cases these scars extend completely across the face; in others, flakes struck from opposing sides meet at the midline. The final retouching along the edges and especially at the base also was done by pressure flaking.

Style 2 (fig. 18, nos. 2, 3, 6; fig. 19, nos. 1, 2; fig. 20, no. 2). *Style 2* points may be distinguished from those of *Style 1* by their sharp lateral shoulders. One of these points is opal, one chalcedony, and one basalt. The basalt point is fragmentary, lacking the base of the stem and the tip of the blade. The complete specimens (fig. 18, nos. 2, 3; fig. 19, nos. 1, 2) are long and slender in shape, the larger of the two measuring 70 mm. in length, 21 mm. in width, and 5 mm. in thickness, whereas the other measures 63 mm. in length, 18 mm. in width, and 5 mm. in thickness. One very interesting characteristic of these two points is the asymmetry of the shoulders. On each point, one shoulder is sharp and the other rounded. While the form of these points is somewhat reminiscent of Sandia points, the probable age difference between the Sandia and Lind Coulee specimens and the much finer workmanship of the Lind Coulee points suggests that no relationship exists. The flaking techniques are identical to *Style 1*, with the flaking scars forming an even more symmetrical ribbon-like pattern. The smaller of the two complete specimens of *Style 2* projectile points exhibits the effects of grinding along the sides of the stem.

2) Parallel-sided stem (fig. 18, no. 1; fig. 20, no. 1). Since only a single specimen of this form was found it cannot be designated a style. It is shorter and broader than *Styles 1 and 2*, being more triangular in shape. The length is 57 mm., the width 24 mm., and the thickness 6 mm. The material is jasper. Like the other points, it was fashioned almost entirely by pressure flaking. No grinding of the sides of the stem is evident in this single example.

b) Non-stemmed projectile points (fig. 18, no. 10; fig. 20, no. 4). The basal portion of a non-stemmed, concave base point was found near the base of the cultural stratum. It is a well-made point. So skillfully was the flaking done that diagonal flakes detached from each edge, and meeting imperceptibly at the midline, give the appearance of a single narrow, ribbon-like flake running diagonally completely across the face. The concave base was formed by even pressure flaking. It would be tempting to say that this is evidence of a Folsom-like point in the Columbia Basin, but in reality at least two of the characteristic Folsom features are lacking. This specimen shows no sign of fluting or basal grinding. It is probable, however, that were the specimen complete it would closely resemble the Classic Folsom points in shape and size. There remains the possibility that this point was broken while being made and before such steps as fluting and grinding would have taken place. This provocative question can only be answered by further excavations at the Lind Coulee Site.

In addition to the broken example of *Style 2* projectile point, fragments of three other points are also of basalt. One of these, a stem, shows evidence of grinding along the edges.

One broken specimen (fig. 18, no. 15) is considerably larger than the other points. The writer is not certain whether this specimen is a large projectile point, or would be more properly identified as a knife.

The projectile points from the Lind Coulee Site show no resemblance to recent points from the Columbia Basin, nor do they resemble any of the points from "Early Man" sites with which the author is familiar. It may be that we are dealing with localized variants of stemmed and non-stemmed projectile points with well-controlled flaking, having a wider distribution in early archaeological horizons. A larger collection of projectile points is needed before specific relationships can be established.

2. Crescentic blades (fig. 21, nos. 1, 2; fig. 22, no. 2*a*, *b*). One complete specimen and a fragment from the center of the blade of another represent this category of implements. The complete crescentic blade measures 56 mm. in a straight line from tip to tip, and 88 mm. from tip to tip when measured around the outside arc of the blade. The maximum thickness of the jasper blade is 6 mm. The fragmentary specimen, which

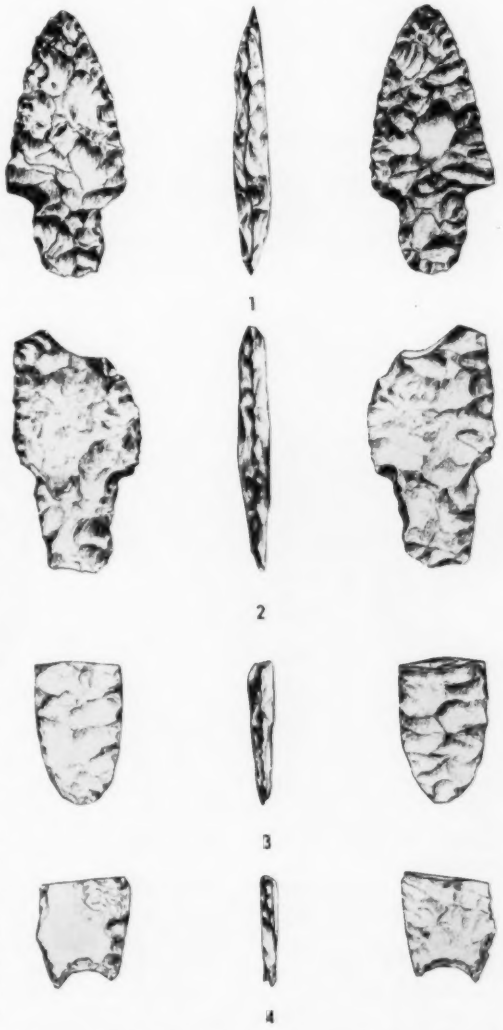


FIG. 20. Projectile points and fragments. 1, 2, *Style 3;* 3, base of point; 4, fragment of concave base point. 1, 57 mm. in length.

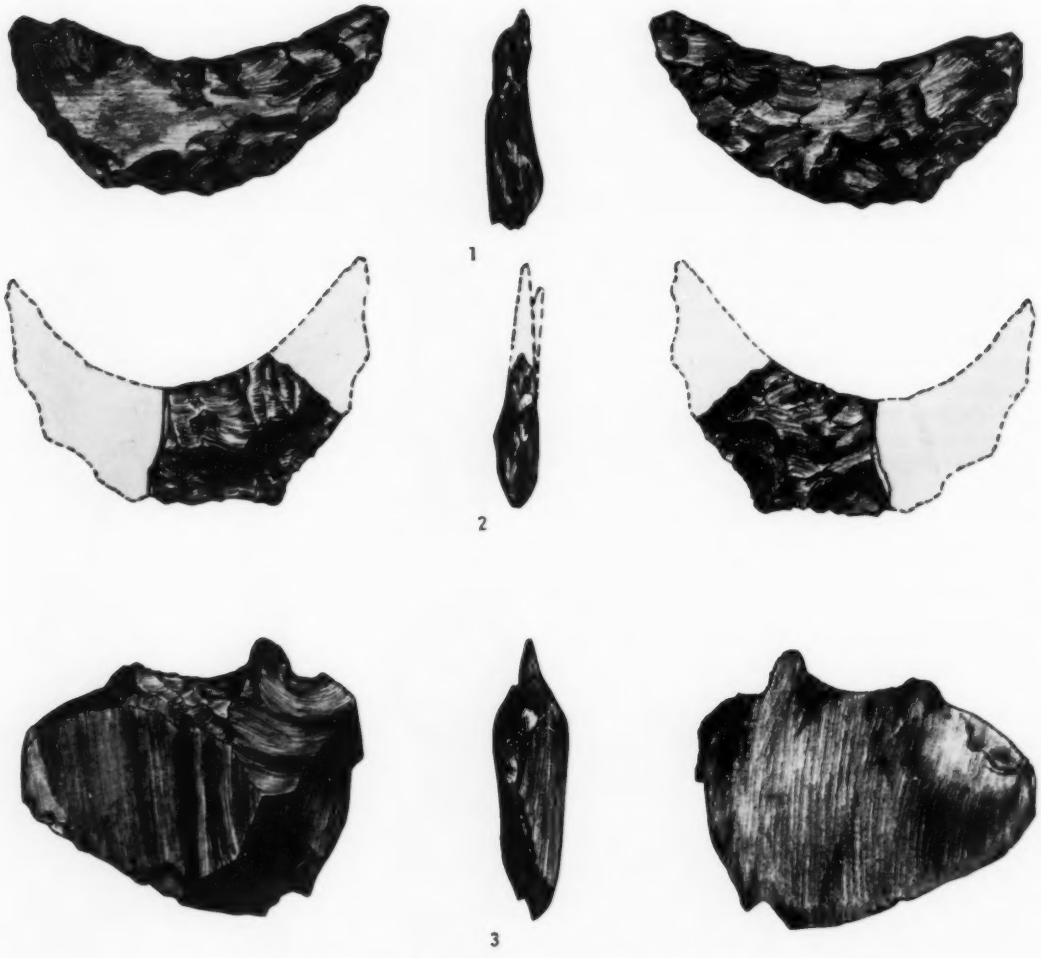


FIG. 21. Crescentic blades: 1, 2. Graver: 3. 1, 56 mm. in length.

is made of semi-opal, also has a maximum thickness of 6 mm. Pressure flaking was the basic technique employed in the manufacture of both specimens.

It is now evident that crescent-shaped blades such as these found at the Lind Coulee Site are quite widespread in the "Early Man" sites west of the Rocky Mountains. It is also of interest that very similar-appearing objects have been found in sites of more recent age, especially in California. The first problem that arises concerning these objects is that of function. Rogers identifies identical-appearing blades from Lake Mohave and the San Dieguito industry as "amulets" (Rogers, 1939: 36, pl. 8, *a, b, c*) (see fig. 22, no. 1). Harrington terms these same implements from the Borax Lake Site, "crescents" (Harrington, 1948: 93–95, pl. XXIV). From the lower horizon at Buena Vista Site 2, Wedel recovered six "crescentic flints" which he indicates are of unknown use (Wedel, 1941: 99–100, 147, pl. 39, *w, x, y*). Jesse D. Jennings, in his preliminary report on the excavations at Danger Cave, Utah, illustrates a crescentic blade which he describes as "unique" (Jennings, 1953: fig. 5). His progress report does not indicate the provenience of this imple-

ment within the site. Cressman reports the finding of a biconvex crescentic blade below the pumice at Paisley Five-Mile Point Cave No. 1 (Cressman, 1942: 84–85). This implement he identifies as his Type 8 "Crescent" scraper. Crescentic blades also have been found in ancient surface camp sites along the shorelines of ancient southern Oregon lakes of Anathermal age (Cressman, 1936).

In terms of function, then, we find one author identifying the crescentic blades as "amulets," another as "crescent scrapers," and others simply identifying them descriptively as "crescents," "crescentic flints," and "crescentic blades." It is my opinion that the double-bevel edge indicate a cutting rather than a scraping function. It appears entirely possible that the crescentic blades found in "Early Man" sites in western North America were originally functional cutting implements, probably hafted, and that these same implements survived into more recent times, but with a ceremonial function indicated by a pendant-like constriction at one end.

The crescentic blades found at the Lind Coulee Site are the only implements of sufficient diagnostic value, and with specific resemblance to similar forms from other early archaeological sites, to warrant the designation as a distinct "Type."

3. Knives. Six double-bevel blades, biconvex in cross-section, probably were utilized as knives. These implements differ from the flake knives in being of greater average thickness (4 mm. to 10 mm.), and in the possession of double-bevel edges. While all the specimens are fragmentary, the original shape appears to have been ovate in outline, with the small end forming a blunt point. The pressure flaking is less symmetrical than that of the projectile points. The working edges, which have an angle of retouch varying from 27 to 37 degrees, extend completely around the perimeter. With the exception of one semi-opal knife, all of the specimens in this category are of chalcedony. The vertical distribution of the knives ranges throughout the cultural horizon.

The generalized nature of these implements lends little toward the establishment of specific cultural relationships. Similar artifacts are common in early archaeological sites. A larger sample of knives from the Lind Coulee Site might well show an overlapping in form with recent knives from the Columbia Basin.

4. Choppers (fig. 23, no. 1; fig. 24, no. 3). Three massive stone implements with crude percussion flaked edges and identifiable as choppers,

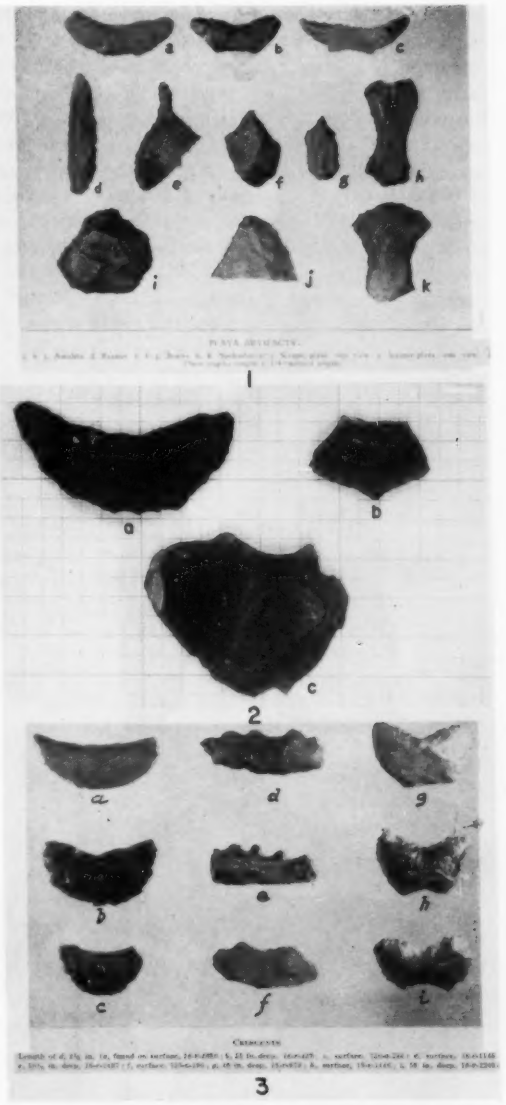


FIG. 22, 1. Playa artifacts from southern California (Rogers, 1939). Note resemblance between "amulets" *a*, *b*, and *c*, the Lind Coulee crescentic blades below (fig. 22, 2), and the "crescents" from the Borax Lake Site (Harrington, 1948) below (fig. 22, 3). Note also the similarity between "spokeshaves" *h* and *k*, and the Lind Coulee *Style 7* scrapers (fig. 14, 7 and 8, and Fig. 17, 2 and 3). (Courtesy San Diego Museum of Man.)

2. Crescentic blades: *a*, jasper; *b* (fragment), semi-opal. Graver: *c*, semi-opal. Scale in millimeters.

3. "Crescents" from the Borax Lake Site, California (Harrington, 1948). (Courtesy Southwest Museum.)

were found in the lower, middle, and upper levels of the cultural horizon, respectively. The largest specimen is a broad, flat piece of basalt with bifacial percussion flaking scars along the edge at the wide end. This chopper has a length of 163 mm., a maximum width of 134 mm., and a maximum thickness of 145 mm. The second chopper is of chalcedony, with a length of 134 mm., a maximum width of 63 mm., and a maximum thickness of 39 mm. The third specimen, also of chalcedony, measures 120 mm. in length, 71 mm. at its maximum width, and its greatest thickness is 46 mm. No attempt was made to alter the gross shape of the stone; the only requirement was a large piece of stone with at least one narrow edge which could be sharpened by percussion flaking.

FIG. 23. Chopper: 1. Pigment palette: 2. 1, 134 mm. in length.

While it may be shown that implements classified as choppers are widely found in early as well as recent sites, a complete lack of diagnostic characteristics makes them of little use in determining cultural relationships.

II. Ground Stone Implements

Of the total number of stone implements found at the Lind Coulee Site, 12.09 per cent were shaped by grinding processes. A fundamental distinction is made between implements which indicate the use of grinding techniques in the shaping process, and those that indicate grinding through use only. Only implements fitting into the latter category were found at Lind Coulee. It is interesting to note that although ground stone implements occur, none of them appears to have been used in connection with the preparation of food. Rather, it was in the preparation of coloring pigment, red and yellow ocher, that the grinding implements were employed.

A. Ground surface developed through use. All of the implements in this category are directly concerned with the preparation of red and yellow pigment. These include two palettes, four hand stones used with the palettes, and a number of pieces of pigment.

1. Palettes (fig. 23, no. 2; fig. 24, no. 2). Two naturally flat pieces of basalt, each having a single smoothed surface, were recovered from the cultural deposit. One specimen is complete, the other is a corner fragment of a palette which appears to have been approximately the same size as the complete specimen. The grinding surface of each specimen is liberally stained with red pigment. The grinding surface of the complete specimen is in the form of a shallow depression in the center of one face. Numerous fine abrasions indicate that a back and forth rather than a circular motion was used. The other specimen is too fragmentary to give much information, but it appears that a larger area of the surface was used. The complete specimen measures 191 mm. in length, has a maximum width of 127 mm., and a maximum thickness of 20 mm. Both palettes were found at the base of the cultural deposit.

Nearly identical artifacts are reported from the Lindenmeier Site. Roberts states,

> One stone is flat, roughly oval in outline, and has a shallow concavity in one face (pl. 16, *c*). Traces of red pigment still adhering to the stone suggests that it functioned as a pigment bowl. It does not seem likely that this was a mortar for grinding paint,

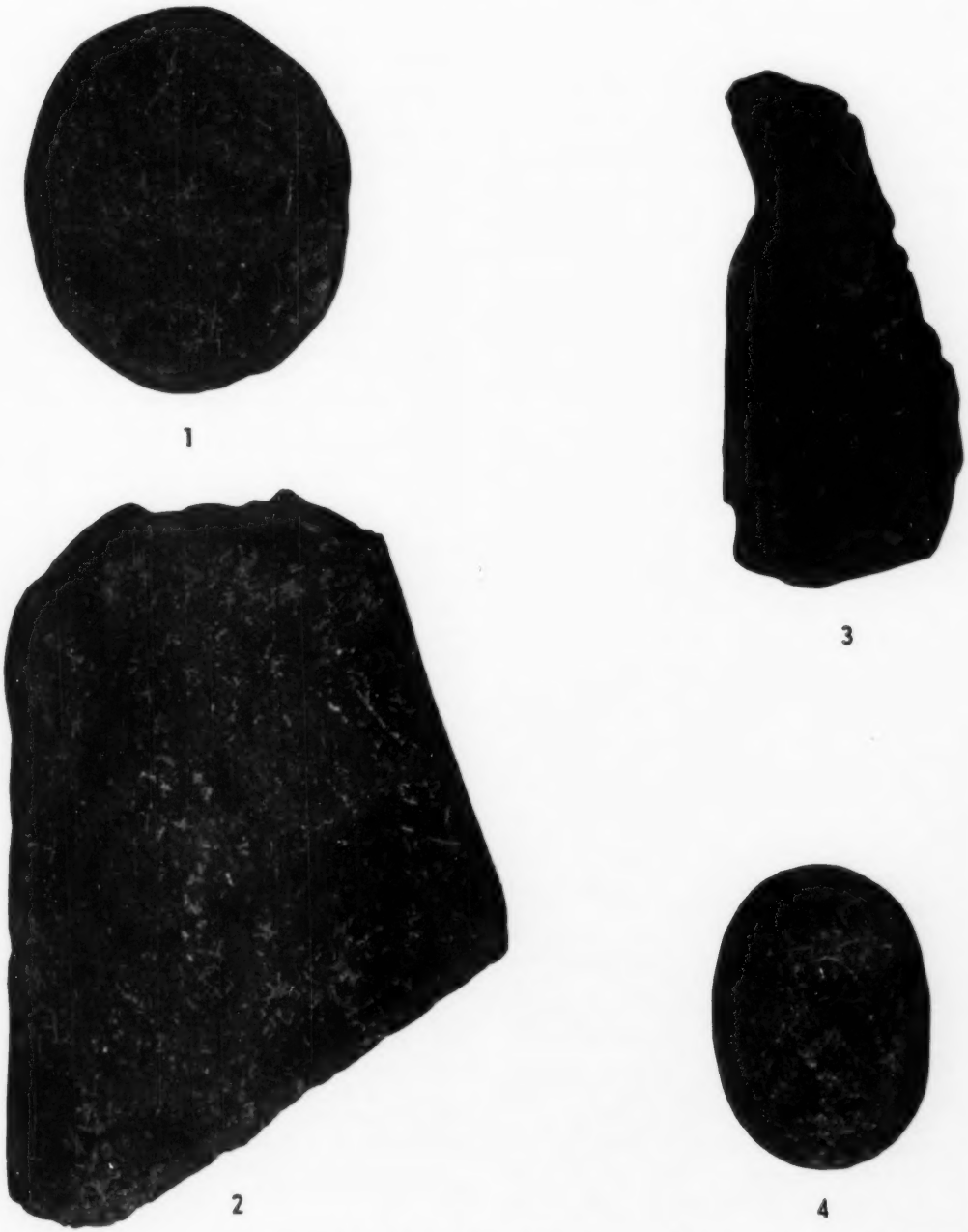


FIG. 24. 1. Basalt handstone; surface stained with red ocher. 2. Basalt pigment palette heavily stained with red ocher. 3. Basanite chopper. 4. Granite handstone heavily stained with red ocher found in association with the pigment palette (*2*).

as it shows no effects of a pestle. It was merely a palette (Roberts, 1935: 30).

Cressman found a metate which had been used for grinding hematite in Catlow Cave No. 1, but does not indicate at what level the metate was found (Cressman, 1942: 89). Heizer reports the finding of a sandstone palette in an Early Horizon site in central California (Heizer, 1949: 23). This artifact, while considerably larger and of much finer workmanship than the Lind Coulee specimen, also carried red pigment stains.

In the Columbia Basin, the use of red and yellow pigment continued into historic times. In the recent sites, however, the method of grinding pigment appears to have been through the use of mortar-shaped rather than palette-like grinding stones.

2. Hand stones (fig. 24, nos. 1, 4). Hand stones or manos were used with the palettes in the preparation of red and yellow pigment. Of the four hand stones found, three are fist-size, naturally ovate, waterworn river cobbles. The other is a somewhat angular waterworn cobble, one-third of which is missing along a longitudinal break. With the exception of one ovate hand stone which is granite, all are basalt. The largest of the ovate hand stones measures 99 mm. in length, 80 mm. in width, with a maximum thickness of 57 mm. The smallest ovate specimen measures 80 mm. in length, 55 mm. in width, and is 38 mm. thick. The angular hand stone measures 130 mm. in length. When found, the smallest of the ovate hand stones (fig. 24, no. 4) was lying beside the complete palette (fig. 23, no. 2; fig. 24, no. 2). The surfaces of the ovate hand stones carry the reddish stains of pigment. The angular specimen carries pigment stains only on the end of a wedge-shaped projection, as if this projection had been used to crush the larger pieces of pigment-bearing stone. Since it is a broken specimen, however, it is possible that the missing face might have been used as an abraiding surface.

Hand stones of this style are so common in early as well as recent sites that little can be said of cultural relationships. Perhaps their most significant characteristic at the Lind Coulee Site is the fact that they appear to have been used only for the preparation of pigment, and not for the grinding of food.

3. Pigment. Sixteen pieces of pigment were found, fourteen of which were red in color (hematite), with the remaining two pieces being yellow (limonite). Four of the specimens of red pigment are softer than the others, with surfaces that show signs of rubbing. It is probable that these are fragments resulting from grinding and mixing with grease, oil, or water. The raw material for the preparation of red and yellow pigment is common in the exposed basalt flows of the Columbia lavas. The fragments of pigment occurred throughout the cultural deposit.

In his petrographic analysis of the deposits, Nering reports finding considerable numbers of minute fragments of hematite in the sands of the cultural horizon.

The use of red and yellow pigment appears to be a trait of considerable antiquity in the New World. Many "Early Man" sites in western North America indicates the use particularly of red pigment. Evidence of its ceremonial use in the Windmiller Facies sites indicates considerable antiquity for this function (Heizer, 1949: 31).

IMPLEMENTS OF BONE

Bone artifacts apparently formed a rather small portion of the total inventory of tools utilized by the inhabitants of the Lind Coulee Site. Only four readily identifiable bone tools, plus a fragment of bone bearing incised marks, were recovered from the site. Preservation, of course, may have played a part here, but large quantities of food bones were recovered which were well preserved, and like the artifacts of bone, rather heavily mineralized. As was the case with the stone artifacts, a heavy encrustation of lime coated the bone implements. In fact, it was often difficult to determine whether or not a bone had been worked until the coating had been removed.

The shaping of the bone tools appears to have been accomplished almost entirely by cutting and scraping green bone with the sharp edges of stone tools. Series of minute parallel grooves record the effects of the flaked edges of stone knives and/or scrapers. Only one implement, a serrated bone point, shows any indication of grinding subsequent to the basic shaping process.

Many of the food bones carried the marks of cutting implements, but these marks probably occurred at the time of dismembering the animals.

All of the bone implements appear to have been made from sections of long bones.

III. Bone Implements

1. Bone shafts (fig. 25, nos. 1, 2; fig. 26, nos. 1, 2, 3). Included in this category are three,

nearly complete, shafts. It is improbable that all three were intended to serve the same function. However, owing to the fact that one or both of the ends of each shaft are missing, it is not possible to be at all certain of their intended purpose. One shaft (fig. 26, no. 3) broken through carelessness while being removed, has one end which has been diagonally cut along one side to form a wedge-shaped point, plano-convex in cross-section. Because of an old break, the shape of the opposite end could not be determined. The incomplete length of this implement is 77 mm., and the slightly oval shaft has a maximum thickness of 14 mm. It is possible that the wedge-shaped end was designed for hafting. This shaft was recovered from a point near the middle of the cultural stratum.

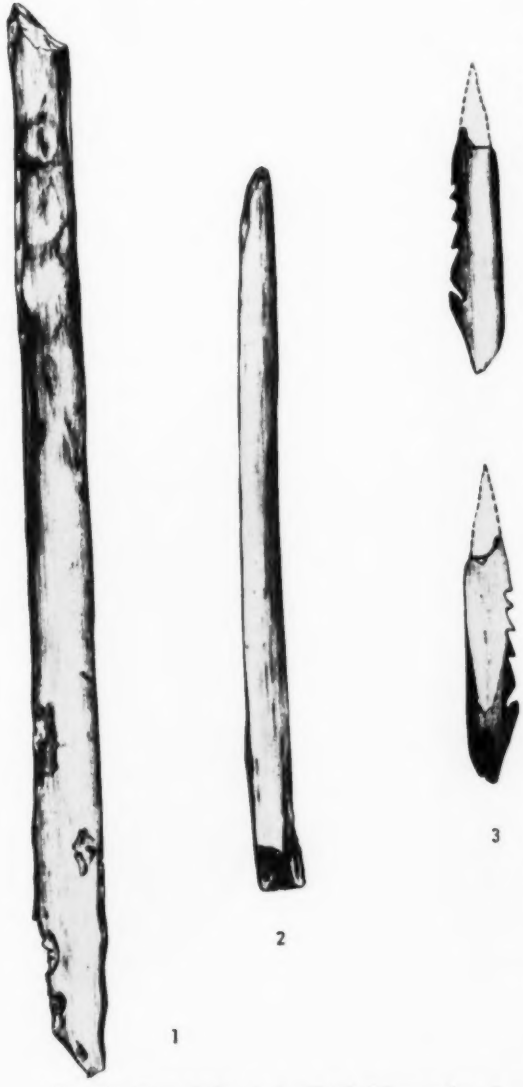


FIG. 25. Bone shafts: 1, 2. Notched bone point: 3. 1, 251 mm. in length.

A second bone shaft (fig. 25, no. 2; fig. 26, no. 2), somewhat smaller than the first, has a very curious appearance. The basal end is missing, but the opposite end tapers to a blunt point. In cross section, this shaft has a very definite plano-convex shape. The flat side of the shaft is the result of purposeful shaping, and not merely a split surface. The convex side rises to a slight keel running longitudinally along the shaft. The length of this broken shaft is 172 mm., the maximum thickness is 11 mm. This shaft also was recovered from near the middle of the cultural stratum.

The third specimen (fig. 25, no. 1; fig. 26, no. 1) is the largest of the three. Unfortunately, both ends of the shaft are missing, but the characteristics of the body of the shaft can be described. At one end, the shaft is nearly round in cross-section; at the other, nearly rectangular. The surface is very irregular, with many scratches and depressions. The incomplete length of this shaft is 251 mm., and the great thickness of the shaft, measured at the rectangular end, is 15 mm. The only possible suggestion of use for this implement is that of a flaking tool. Like the other two bone shafts, this example was found near the middle of the cultural horizon.

Bone shafts are not unknown from other Early Man sites. Cotter found bone shafts, sharp at one end and beveled at the other, at the Clovis Site (Cotter, 1937: pl. 2). Cressman reports the finding of nearly identical bone shafts, which he identifies as "foreshafts," at the Narrows on Lower Klamath Lake (Cressman, 1942: 99–100). The beveled end of the first bone shaft described here from Lind Coulee may indicate a functional similarity and perhaps cultural relationships with the bone shafts from Clovis and/or the Lower Klamath Lake site.

2. Notched or serrated bone point (fig. 24, no. 3; fig. 25, no. 5). This very interesting artifact is, unfortunately, too fragmentary to indicate with certainty what its original function might have been. Both the tip and the base of the point are

FIG. 26. 1. Bone shaft (both ends missing). 2. Bone shaft. 3. Tapered bone shaft (lower end missing). 4. Fragment of long bone with numerous cuts on surface. Appears to have been used as base or anvil for some cutting or chopping operation. 5. Notched bone point (broken). Note that the serrations at the top are at a different angle than the bottom notch, suggesting that the latter may have been used in hafting.

missing, and while one can probably extrapolate the shape of the tip with little error, the broken base gives but a slight clue as to means of attachment. The point was apparently made from a thick piece of a long bone which was first rounded, then cut diagonally from one side to the other, leaving it plano-convex in cross-section toward the tip. Four shallow serrations angle toward the tip, with one serration oriented in the opposite direction. The latter appears to have served as an aid to hafting. Scars on the surface indicate that the point was shaped by cutting with a stone blade. The rounded surface shows signs of smoothing by grinding or abrasion. The length of this fragmentary piece is 59 mm., and the maximum thickness at the basal end is 11 mm. The small size of the point and the shallowness of the serrations indicate that it probably was not used on large animals. Small mammals, fish, or birds might have been hunted with some success with such a point. The writer can find no mention of comparable serrated or barbed points in the literature. On the basis of the radiocarbon date of 8,700 plus or minus 400 years for the archaeological deposits, this appears to be the earliest recorded use of serrated bone points in the New World.

3. Miscellaneous bone objects (fig. 25, no. 4). A sizable fragment of a long bone of some large animal, probably bison, is of interest because of a great many fine cuts which scar its surface. The cuts are oriented across the bone rather than longitudinally along it. The only purpose that can be suggested for this fragment of bone is that of a base for some type of cutting operation. This bone fragment came from near the base of the cultural deposit.

COMPARATIVE STATEMENT

DATING THE CULTURAL HORIZON

In attempting to arrive at the age of the cultural materials in the Lind Coulee Site, data from a number of lines of evidence have been employed. It may be noted in the discussion that follows how closely the data from one line of evidence tend to be supported by those from other methods of approach.

Geology

We have seen in the discussions of the geology and stratigraphy of the site that if the radiocarbon dates from late-Pleistocene and post-Pleistocene events are followed, geological evidence indicates that the occupation of the site occurred at some time within the period of from 11,000 to 6,000 years ago.

FIG. 27. View of excavations during 1952 season. The men working in the north-south trench are uncovering the bison bones shown in fig. 28 (below). The original surface at this point was approximately 6 feet above the top of the trench walls before removal of overburden by the bulldozer. View looking north.

Paleontology

Evidence from the faunal remains recovered from the cultural horizon is less conclusive than the geological evidence, but in a general way tends to substantiate the geologically derived dating estimate. The relatively high degree of mineralization of the bones is suggestive of some antiquity, particularly in light of the low calcium carbonate content of the deposits which would indicate rather slow mineral replacement. It is unfortunate that no bison remains of sufficient diagnostic value for species identification could be found. It is not necessary, however, that the remains of the bison found in the cultural deposits be those of some fossil form, for *B. Bison bison* apparently flourished in the area within the period of time suggested by the geological evidence (Skinner and Kaisen, 1947: 127–256).

A study of the types of fauna represented in the collection from the cultural deposits suggests that the climatic conditions differed considerably from the semi-desert environment of today. Muskrat, beaver, bison, greenwinged teal, and goose indicate a period of greater moisture and a different type of vegetative cover. The cool, moist conditions of the Anathermal period could have pro-

FIG. 28. Bison bones *in situ* in north-south trench shown in fig. 27 (above). View looking south.

vided the sluggish stream or lake in which the sediments of Bed D developed, and the general environmental conditions suitable for the type of faunal assemblage recovered.

Paleoclimatology

Evidence of the climatic conditions prevailing during the occupation of the site is supplied by geological, paleobotanical, and paleontological studies. Prior to the deposition of the culture-bearing sands a proglacial climate prevailed. Evidence for this is supplied by the underlying Touchet Beds which are considered to have formed under such conditions. The culture bearing sands were deposited when large quantities of water existed in the now-desert environment of the Columbia Basin. The cool, moist, Anathermal period is suggested for this event. As previously mentioned, the faunal types suggest a period of greater moisture than now prevails in the Columbia Basin for the period of occupation of the site. Overlying the culture-bearing sands is a thick layer of loessial material containing lenses of volcanic ash. The warm, dry climate of the Altithermal period, during which a great deal of volcanic activity is known to have occurred, is probably the period of time of this loessial deposition.

Radiocarbon Dating

In the process of excavating the site during the 1951 season, fragments of burned bison bones were collected for purposes of radiocarbon analysis. Burned fragments were selected because they demonstrate cultural association, and because of being burned, were less mineralized and therefore more suitable for radiocarbon analysis. The radiocarbon dates obtained were: 9,400 plus or minus 940 years, 8,518 plus or minus 460 years, for a weighted average of 8,700 plus or minus 400 years.

CULTURE RELATIONSHIPS

Intra-Areal Relationships

In comparison with some of the other physiographic provinces of comparable size in western North America, the Columbia Intermontane province has yielded little in the way of Early Man sites. At Fort Rock Cave, located in the Harney-High Desert section in Oregon, Cressman discovered stemmed and unstemmed projectile points, scrapers, drills, manos, atlatl fragments, basketry and sandals, underlying Newberry Crater pumice (Cressman, Williams, and Kriger, 1940: 64–69). A radiocarbon date of 9,053 plus or minus 350 years was secured on sandals from this horizon (Libby, 1952: 87). Stratigraphic evidence indicates that only a brief period of time elapsed following the deposition of the pumice before the cave was reoccupied. It appears that Fort Rock Cave was sporadically occupied from the Anathermal period until recent times.

At Odell Lake, which lies north and west of the Fort Rock Valley, Cressman tested an early camp site located on the lake's shore (Cressman, 1948: 57–58). Projectile points, flakes, hammerstones and the remains of fires were found underlying a layer of water-laid Crater Lake pumice. According to Cressman, the closest resemblances of these artifacts seems to be with the lower Klamath Lake localities.

Northwest of Odell Lake, and in the vicinity of the Wikiup dam site, two thin ovoid knives or scrapers were recovered from a soil test pit by Bureau of Reclamation workmen (Cressman, 1937: 53–67). The implements are believed to have come from a level underlying a layer of Crater Lake pumice. Cressman believes that, because of typological resemblance to early scrapers from southern Oregon, and because of their occurrence under Crater Lake pumice, these specimens should be attributed to Early Man in Oregon.

The questionable association of artifacts and mammoth remains at two sites in the Willamette Valley has been reported. At the Kirt School Site, two points described by Cressman as re-

sembling "collateral Yuma" points and "Sandia" points were recovered from a drainage ditch, reportedly from a stratum containing mammoth bones (Cressman, 1947: 177–179). At the Lebanon Site near Lebanon, Oregon, flint ships, a worked bone chisel, and mammoth bones were taken from debris removed while cleaning out a spring (Cressman and Laughlin, 1941: 339–342).

In the Johnson Park Reservoir area of Idaho, lying within the Malheur-Boise section, Louis Caywood picked up a point which he feels falls within the Yuma category (Caywood, 1948: 251). The point was recovered from the bed of a small stream, and no cultural, geological, or paleontological association was evident.

The sites within the Columbia Intermontane province, then, for which there appears to be no question as to their antiquity, are the Wikiup Site, the Odell Lake Site, Fort Rock Cave, and the Lind Coulee Site.

The knives from the Wikiup Dam Site offer little in the way of suggesting cultural relationships. Had the knives been found under less favorable geologic circumstances, it probably would have been impossible to equate them with early cultural horizons on the basis of typologic resemblance alone.

It is Cressman's opinion that the cultural material from the Odell Lake Site shows closer affinities to the Lower Klamath Lake material than it does to the southern Oregon caves (Cressman, 1948: 57–58). The Odell Lake artifacts bear no close resemblance to the cultural materials from other Early Man sites within the Columbia Intermontane province. With the publication of radiocarbon dates for the Mankato advance, Cressman has probably revised downward his dating estimates for the Odell Lake Site. This writer can see no evidence supporting the original estimate of from 10,000 to 14,000 years ago (*ibid.*, 58).

As was the case with the Odell Lake Site, the Fort Rock Cave materials show closer resemblances to material from outside the Columbia Intermontane province than to material from within. One difficulty in comparing this material with that from other early sites within the Columbia Intermontane province arises from the fact that Fort Rock Cave is the only site contributing perishable material such as sandals, matting, and basketry. It is natural that resemblances would appear to be closer to sites containing comparable materials. These other sites are located outside the Columbia Intermontane province, specifically, Basin and Range caves, and relationships appear strongest in this direction. Some slight resemblances between the Fort Rock Cave material, and the Lind Coulee artifacts may be noted. Side scrapers, snub-nosed scrapers, and plano-convex scrapers from both sites are quite similar in appearance. One paint mano was found at Fort Rock Cave, and several were found at the Lind Coulee Site. Certain marked differences in material culture may be noted, however. Whereas at Fort Rock Cave the bulk of the projectile points were of stemless varieties, only one stemless point was found at the Lind Coulee Site. The stemmed points from Fort Rock Cave were either corner-notched or side-notched, but the stemmed points from Lind Coulee are narrow-shouldered, with parallel-sided or contracting stems. It is plain, then, that only the most general resemblances exist between the Fort Rock Cave Site and the Lind Coulee Site.

The relationships between the Lind Coulee Site and other Early Man sites within the Columbia Intermontane province have already been discussed. As was the case with the other sites, the Lind Coulee Site shows its closest relationships to materials from sites located outside the Columbia Intermontane province. These resemblances are, however, of the most general kind in most instances.

In summary, it is evident that at the present stage of our knowledge concerning Early Man in the Columbia Intermontane province, the presently known sites, especially Fort Rock Cave, the Lind Coulee Site, the Odell Lake Site, and the Wikiup Site, show closer resemblances to materials from sites outside this area than they do to one another. It must be remembered, however, that we are dealing with a small number of sites scattered over a large geographic area. Only a slight correlation can be recognized between the culture manifested by these sites and their common physiographic distribution. When more Early Man cites are known within the area, it may be possible to demonstrate a closer degree of cultural relationship. The possibility that this lack of specific resemblances might be due to different cultural orientations will be discussed in the following section.

Inter-Areal Relationships

This author has no intention of reproducing the detailed evidence linking the southern Oregon cave material with other caves in the Basin and

Range province and with certain California sites. This has been done in a detailed manner by Cressman (Cressman, 1942: 135–140). Rather, a general reassessment of this relationship will be presented with the additional new evidence offered by the Lind Coulee material, and the recent preliminary report on the Danger Cave Site (Jennings, 1953: 179–213).

We are somewhat handicapped in our comparison of the Lind Coulee material with that from other early sites because of the lack of perishable items so common in the Early Man sites from the Basin and Range province, and because of an assemblage of stone tools which is largely made up of rather non-diagnostic scrapers. Certain specific relationships can be pointed out, however. Perhaps the most outstanding of these relationships is based on the occurrence of crescentic blades at the Lind Coulee Site, and the distribution of identical objects in early sites in Oregon, California, and Utah. Cressman has reported the finding of these blades below the pumice in Paisley Five-Mile Point Cave No. 1 (Cressman, 1942: 84–85), and in Guano Valley in southeastern Oregon (Cressman, 1936: 35, pl. 10, fig. 13). Jennings reports similar objects from Danger Cave, but in his preliminary report does not indicate the provenience (Jennings, 1953: fig. 5). Harrington indicates their occurrence at Borax Lake (Harrington, 1948: 93–95, pl. XXIV), and Rogers also records them from Phase II of the Playa Industry of the lower Colorado region (Rogers, 1939: 33, pl. 8).

The projectile points from Lind Coulee are, for the most part, entirely unique when compared with other early projectile points from North America. The only non-stemmed point is the basal section of a concave-base point. In general outline, this point resembles the Folsom points of the Plains region. However, there is no indication of fluting or basal grinding of the edges. One cannot justify claiming Folsom relationship on the basis of a single broken specimen.

Three other classes of implements show resemblances to materials found at the Lindenmeier site in Colorado. The first of these is the large keeled scrapers (Roberts, 1935: pl. 9, *b, c, h*). A graver from the Lind Coulee Site also shows close identity with certain Lindenmeier specimens (Roberts, 1935: pl. 13; Roberts, 1936: pl. 9). A flat basalt grinding palette for pigment and several cobble manos from the Lind Coulee Site suggest similarity to a palette stained with pigment from Lindenmeier.

The use of pigment and grinding stones is also reported from Roaring Springs Cave and Catlow Cave (Cressman, 1942: 89–90). The Roaring Springs Cave specimen is reported from the basketry level, while the provenience of the Catlow Cave specimen is not indicated. Heizer reports the use of pigment and grinding palettes in an Early Horizon site in central California (Heizer, 1949: 23).

Several bone shafts were recovered at the Lind Coulee Site. One of these exhibits a beveled end which may indicate a functional relationship to similar shafts recovered at the Clovis Site and at the Narrows on Lower Klamath Lake (Cotter, 1937: pl. 2; Cressman, 1942: 99–100).

In summary, it can be seen that the limited collection of artifacts from the Lind Coulee Site, while appearing basically unique in light of present knowledge, suggests general relationship with other sites. The few general resemblances referred to between the Lind Coulee material and that from the Lindenmeier Site appear insufficient to imply relationship. The closest resemblances are found between the Lind Coulee material and certain implements from the early sites of southern Oregon, Danger Cave in Utah, and the Borax Lake and Playa Industry sites of California. The diagnostic crescentic blades are included in the collections from each of these sites. Concave base points were found at the Lind Coulee Site and at Borax Lake. Bone shafts from the Lind Coulee Site appear to resemble similar implement from the Narrows locality of Lower Klamath Lake. Resemblances of a more general order, implying relationship, may be observed with a wide area of the Basin and Range province on a less specific level. The assemblage of artifacts including stemmed points, large keeled or domed scrapers, gravers, and the use of grinding implements, suggest certain cultural similarities throughout this general region. This view is consistent with the earlier views of Cressman and with the recent findings of Jennings. The writer is in general agreement with the recent statement by Jennings which was written from the perspective of the Danger Cave data. Jennings writes,

> At Danger the early existence of basketry of virtually every known western type (Catlow twine is conspicuously absent), the later occurrence of the L-shaped awl, a diversity of chipped flint artifact types, the slab milling stone, etc., strengthen the probability that very early there existed a vast zone extending from Oregon across the Southwest over into the Middle West and into Mexico where the basketmak-

ing-collecting-wandering way of life was dominant. Cressman (1942) has already hinted at this distribution, which he thinks is earliest in the Northwest. From this base the Basketmaker and Pueblo cultures developed. And it seems highly probable that the enigmatic Fremont Culture of eastern Utah and western Colorado can be demonstrated to have its strongest roots in the generalized Basketmaker base represented in deep and stable perspective by the long Wendover series and first seen in promise in Nevada's Etna Cave (Wheeler, 1942). Further, it seems very probable that the core of the Promontory culture of Utah is not, as Steward believed, a recent manifestation of an Athapaskan migration, but is in truth an older and normal local expression of the long and placid stream of basic Basin culture, which has always been much as observed historically in 1850. (Jennings, 1953: 204).

It appears that on the basis of the Lind Coulee material we may now extend this early area of basic Basin culture into Washington. The Lind Coulee Site may, perhaps, be correctly recognized as a northern variant of this basic cultural stratum with a strong economic orientation toward hunting.

Whether or not, as suggested by Cressman, this basic Basin Culture is earliest in the north, we cannot yet decide. Certainly the Lind Coulee material contributes nothing to validate this theory.

CONCLUSIONS

During the moist climatic conditions of the Anathermal period, following the retreat of the final phase of Wisconsin glaciation, a sparse population of early hunters was resident in the Columbia Intermontane province. Evidence of this occupation is provided by cultural materials from the important Fort Rock Cave Site in south-central Oregon, the Odell Lake Site and Wikiup Sites in central Oregon, and the Lind Coulee Site in central Washington. Geologic evidence confirms the dating in each case, and in addition, radiocarbon dates were obtained for the Fort Rock Cave Site and the Lind Coulee Site.

Climatic evidence indicates a moist period with numerous lakes and streams. In the case of each site, the locality was near a source of water. Faunal evidence from the Lind Coulee Site is also indicative of a climate more moist than that now prevailing.

At the Lind Coulee Site, where a fair sample of animal remains was recovered, it was evident that the primary source of food was the bison, with some dependence on smaller game animals and waterfowl, including muskrat, skunk, ducks, and geese. No artifacts were recovered at the Lind Coulee Site that would indicate any marked orientation toward vegetable foods. Several grinding stones and manos were recovered from Fort Rock Cave which might indicate a greater dependence on this type of food in the northern Basin and Range area.

Numerous scrapers of different styles were found at Fort Rock Cave and at the Lind Coulee Site, with a few represented in the collection from Odell Lake, indicating the use of animal skins for clothing and perhaps other products as well.

In comparing the cultural materials from the early archaeological sites within the Columbia Intermontane province, it was found that only very slight resemblances could be noted. Sites were found to bear a closer resemblance to sites outside the area than to each other. Several factors appear to be responsible for this situation. The fact that we are dealing with a few sites scattered over a wide geographic area is no doubt partly responsible. The fact that perishable items were found at the Fort Rock Cave Site and none was found at the other sites also tends to emphasize the differences. Finally, there can be no doubt that certain localized cultural manifestations, with their own unique characteristics, had developed by this period of time within the Columbia Intermontane province. The Oregon sites show the closest resemblance to the Northern Basin and Range sites. The Lind Coulee Site resembles most closely certain Basin and Range sites as well as certain early California sites, but these resemblances are in general, slight.

The material from the Lind Coulee Site points to its inclusion within a generalized early cultural manifestation in western North America. Such broad traits as an emphasis on stemmed and concave-base points, heavy keeled and domed scrapers, bone shafts, and the widespread use of ocher, as well as such specific traits as the widespread use of crescentic blades, are indicative of this generalized cultural base. The rather distinctive characteristics of the projectile points from the Lind Coulee Site are suggestive of localized variations.

The intensive archaeological research programs underway in the Columbia Basin will undoubtedly uncover additional Early Man sites in this region. Only then will the Lind Coulee material be clearly seen in its proper cultural perspective.

GEOLOGY OF THE SITE AND SURROUNDING AREA: LATE CENOZOIC HISTORY OF THE REGION

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GEOMORPHOLOGY

The Lind Coulee Site physiographically falls within the Central Plains section (see fig. 2, p. 227) of the Columbia Basin subprovince, which is the northernmost of four parts of the Columbia Intermontane province (Freeman *et al.*, 1945: 60–61), and consists of a modified plain of Miocene basalt flows. The Central Plains section is topographically the lowest area of the basin and is surrounded by higher land: the Waterville Plateau atop a monoclinal flexure to the north; the Channeled Scablands and the Palouse Hills sections to the northeast and southeast, respectively, where the basalt series slopes gradually upward; the North Central Oregon Plateau, which extends west to the Oregon Cascades from the low south part of the Central Plains section; and the Yakima Folds section, characterized by anticlinal ridges of basalt that decline and die out eastward from the Washington Cascades and are lost under the Central Plains section. Near the Lind Coulee Site the basalts are nearly horizontal, and their top surface has an elevation of about 1,150 feet above sea level; but only a few miles to the southwest are the low easternmost swells of the Frenchman Hills and Saddle Mountains anticlinal ridges.

COLUMBIA RIVER BASALTS

Although basalts of both early and late Cenozoic age occur elsewhere in the Columbia Basin subprovince (Washington, 1922: 775–780), the main bulk of them are of Miocene age—a known middle Miocene age in the Puget Sound area (Weaver, 1937: 184–185) and a probable upper Miocene or even Pliocene age to the east (Berry, 1932: 32; Waters, 1955*a*: 664). These basalts constitute one of the world's great areas of flood basalt, the Miocene series covering an area of fully 100,000 square miles, of which the Columbia Basin subprovince forms the northern one-third to one-half. They issued upon a maturely dissected surface having a relief of the order of 2,000 feet (Waters, 1939: 646–648), and their maximum thickness is more than 5000 feet (Waters, 1955*b*: 708). The blocking of streams by the lava flows, particularly in the early stages of the eruptions, resulted in swamps and lakes (Pardee and Bryan, 1926: 15–16), in which were deposited sediments bearing plant remains that suggest a Miocene climate more rainy and possibly slightly warmer than the present (Berry, 1929: 233–234); and this, in turn, may mean that the Cascades were still too low to cast their present rain shadow.

POST-BASALT FOLDING

The deformation which produced the east-trending Yakima folds is thought by Eardley (1951: 452–453) to have taken place in the late Miocene and early Pliocene, and the broad north-south warpings of the Cascade Mountains and Puget Trough from late Pliocene to early Pleistocene (*idem.*, 453–454). This is possible if, as a majority of these workers contributing to the problem believe, the Ringold formation is a result of the rise of the Yakima Folds, and therefore to be contemporaneous with (Warren, 1941: 221–222), or later than this deformation (Merriam and Buwalda, 1917: 260; Lupher, 1945: 338; Mason, 1953: 50–54). Waters (1955*a*: 680) has lately demonstrated that the Columbia River has occupied essentially its present route through the Ringold area since the late Pliocene Ellensburg fans forced it there, slipping eastward only a little during the rise of the Horseheaven anticline. The Ringold is interpreted by all workers as a combination of floodplain and lake deposit, over 500 feet thick, deposited by the Columbia River and its tributaries; and its age, as determined from vertebrate remains, has been placed at Late Pliocene to Early Pleistocene (Strand and Hough, 1952). Confirming Waters' conclusion, somewhat similar fluviatile sedimentary rocks to the north and northeast of the type Ringold locality near Pasco are older than the folding (i.e., have been warped up along with the basalts); and if these are a part of the Ringold formation (Culver, 1937; Beck, 1940; Twiss, 1933), then the warping of the Yakima Folds *must* have taken place since Middle, or even Late Pleistocene. The problem can be resolved only when and if fossils or other age criteria are recognized in the elevated beds.

It is generally agreed that by the time of the Wisconsin glaciation, the Yakima Folds, and espe-

cially the Horseheaven Hills anticline, were essentially at their present height, that the Wallula Gap was being utilized by the Columbia as a watergap as at present, and that most of the Ringold beds had been removed by erosion. The Lind Coulee area at this stage shares with the Channeled Scablands and Palouse Hills sections (fig. 2) the problem of the widespread loess, probably windborne, of southeastern Washington.

PALOUSE LOESS

The Palouse loess, by whatever proper formational name it is ultimately known, is a distinct lithologic unit composed of a nearly uniform tan clay-silt mixture of minerals foreign to the underlying basalt. It blankets the bedrock with hills 100 to 150 feet high, smoothly rounded and asymmetrical, with 35 degree slopes on their steeper north sides. Rieger (1952: 23–31) has made an exceptionally careful evaluation of the numerous conflicting theories of origin of the loess (residual soil, glacial outwash, periglacial wind deposit, and desert wind deposit derived from the Ringold formation); and he concluded, upon the basis of hypersthene distribution, that the main loess is periglacial, but the top veneer, or "superficial loess" of Flint (1937: 214–215), was brought from the west. Most recently, McCreery (1954) considers that the entire formation was derived from the Ringold, to the west, since particles of low-index (non-basaltic) glass occur to depths of 12 feet over a considerable area, and these are presumably from Cascade volcanoes.

In the Channeled Scablands section the loess has been removed wherever outwash channels from the Mankato ice occurred, and perhaps during the preceding glacial substage as well, though Flint (1937: 212, and 1938: 521) considers that minor readvances of a single ice sheet would accomplish the results visible in eastern Washington. The erosional debris of the scabland channels in the basalt, together with glacial outwash carried through the channels by meltwater, was deposited over a broad area in and beyond the Central Plains section; and it is largely with such deposits and their partial dissection that the Lind Coulee stratigraphy is concerned.

LAKE LEWIS

The glacial outwash of the Central Plains section, which thus postdates the Palouse loess, consists of sharply crossbedded coarse deposits of rapid streams, and more evenly bedded and better sorted silts and sands of ponded water. The former are found more within the Scabland Channels and major stream valleys. Overlying and merging with them at elevations below 1,150 feet, and distributed over a wide area, are the ponded-water deposits, called by Flint (1938: 493–500) the Touchet beds. Most workers have considered these well-bedded fine sands to have formed in an extensive lake, upon whose surface floated icebergs containing boulders which melted out and sank to the bottom at elevations up to nearly 1,300 feet; the highest is reported (at second hand) by Bretz (1923: 605) at 1,283 feet, but most have been found below 1,200 feet.

This body of water left traces that were recognized first by Symons (1882) who named it Lake Lewis in honor of the explorer. Russell (1893: 26–27) attributed terrace levels at 1,400 feet, north of the basalt plateau, to the surface elevation of Lake Lewis, though he recognized only one delta: that formed by the Columbia itself, where it entered Lake Lewis close to the outlet of Lake Chelan. Hodge (1934: 7) believed that even higher terraces and other features at about 1,900 feet elevation marked the level of the combined Pleistocene Lakes Lewis and Condon, backed up behind the fault-weakened but unbreached Cascade Mountains; and that only after this lake had lowered its outlet to about 1,150 feet (accounting for about one-third the depth of the present Columbia River Gorge), did Lake Lewis overflow the low saddle of the Horseheaven Hills and initiate the cutting of the water gap there. Later workers have preferred to limit the level of Lake Lewis to about 1,200 feet, and to explain the high northern terraces differently. Waters (1954) notes that the downcutting of the Wallula and other water gaps was not initiated at the lowest cols of the anticlinal ridges blocking the rivers, and thus implies that the location of the water gaps was not controlled by the level of a lake. His subsequent work (Waters, 1955*a*: 680) amplifies this idea.

The ponding of Lake Lewis, if such a continuous lake existed, is variously attributed to lava blockage in the Cascades (Hodge, 1934); to regional submergence of the Cascades (complete with gorge) and entry of the ocean (Bretz, 1919, who cites Condon and Russell); to ice blockages in the Columbia Gorge, narrowed by land-sliding (Russell, 1893: 26; Allison, 1933: 718–721; Flint, 1938: 493); and to piling-up of the huge volume

of the Spokane Flood, unable to pass rapidly enough through the Wallula Gateway at peak flood (Bretz, 1925: 236–240), because the excessive depth of the Columbia below the Gateway reduced the gradient of the impounded flood (Bretz, 1928: 323–324).

Lupher (1944: 1440–1442) best documents the idea that Lake Lewis was not a single, widespread, long-lived lake, but a fluctuating one; and that the Touchet deposits are in a large part floodplain and ephemeral lake deposits. The thin irregular clastic dikes which, as both Lupher and Flint pointed out, are characteristic of the Touchet beds, are attributed by Lupher to uneven settling of poorly consolidated sediments overlying trapped and melting ice blocks. This interpretation argues a proglacial age for the Touchet lake-plus-floodplain beds (Lupher, 1944: 1453–1458).

SCABLAND GRAVELS

The lenses and beds of coarse crossbedded sand and gravel in the Scabland channels, in protected side canyons along the Snake River and in large rounded hills along and near the Snake, have received much attention which has led to no general agreement. A number of anomalous features, both erosional and depositional, led Bretz (1923 *et seq.*) to formulate his Spokane Flood hypothesis, which he worked out very thoroughly in the 1920's, and on which he has resumed work since 1950. Subsequently Hodge (1931, 1934), Allison (1933, 1941), and Flint (1938) proposed alternative explanations of the same features. These ideas have been well summarized by Flint (1938: 466–468) and Lupher (1944: 1436–1437). Perhaps Flint's fill hypothesis best fits the facts of the Lind Coulee Site, whatever one may say about its over-all adequacy, because the beds here conform with the idea of a slow proglacial stream aggradation in response to a rising lake base level (Beds F and E of fig. 8, p. 23); a period of channel cutting and filling (Beds D, C, and B) and a final period of wind deposition and of gullying by intermittent small floods under conditions like those at present (Bed A, the ash lens, and the recent channel).

PRELIMINARY STATEMENT ON THE GEOLOGIC AGE OF THE BEDS IN LOWER LIND COULEE, WASHINGTON

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Cultural material, vertebrate bones and invertebrate shells have been obtained in a sandy bed cropping out on the east wall of Lind Coulee about two miles northeast of the town of Warden, in eastern Grant County, Washington.

The lowest sedimentary bed appearing in this portion of the Coulee is a thin, possibly lenticular band of gravel. Only a few inches of this bed crops and it may extend down three or four feet to the surface of the underlying basalt. The bed next above, which may be designated No. 2, comprises more than six feet of brown, hard sandy strata in which lie the beds containing artifacts. Over this zone of sandstone, unconformably, is bed No. 3, a fine sandy silt, probably wind-borne material, about four feet thick. Still higher in the section is No. 4, a light, gray, fluffy bed which is about one-fourth volcanic glass and hornblende crystals, also without marked bedding and presumably aeolian in origin. The uppermost stratum, a bed of relatively pure pumicite, or volcanic glass, appears in small lenses in but one or two places in this portion of the Coulee. It seems to occupy slight erosion depressions in the beds called Nos. 3 and 4, but to date has not been seen lying on the lower sandy zone, called No. 2.

There are a number of interesting and significant details connected with the above section, from which some inferences can be realized, but which need not be recorded here. It may be stated, however, that there appears little question but that the upper, or windblown, beds Nos. 3, 4, and 5 were deposited on an erosion surface in the sandy lower beds; they are distinctly younger than the artifact-bearing beds.

One-quarter mile up-valley the west wall of the Coulee shows a thick series of sands with some gravel. These appear to be lying on the basalt floor of the Coulee and are clearly cut out and replaced by later beds locally. The later beds resemble beds 3 and 4 of the east wall, downstream, but actual identity has not yet been proved.

Determination of the age of the artifact-bearing bed will involve its relation to the basalt underlying the entire area, to the Ringold beds which are considerably younger than the basalt, and to the Touchet beds which are somewhat younger than the Ringold. Data now at hand permit the following statements on each of these.

It does not appear possible that the bed in question could be correlated with the Ellensburg epoch, tentatively placed in the mid-Miocene by Smith and Calkins and coming at the close of the outpouring of the Columbia River lavas. This is inferred from the fact that the basalt, wherever exposed in this region, reveals considerable erosion of its surface, and some deformation. In other words, there seems to be an erosion surface cutting across the basalt flows at low angles and constituting an unconformity of some importance. Above this hiatus are Pleistocene rather than Tertiary beds. The Ringold beds, typically exposed at White Bluffs on the Columbia River, appear to have been deposited in quiet water of a lake or ponded area. Marginal to the main area of deposition there would have been limited zones in which beds of the character of that in question could have been deposited. The same relationship might have obtained in the case of the somewhat younger Touchet strata. Indeed there are some points of evidence favoring the deposition of the artifact-bearing bed in Touchet rather than Ringold time.

Translating the above geologic relationships into units of human time is of course hazardous, yet it can be done within wide limits. Since the bed in question is post-basalt, the oldest possible age is about the close of the Tertiary period, a matter of a million or more years. For the other limit, Ringold time is thought to have been very early Pleistocene while Touchet time is considerably later, but still probably earlier than the most recent invasion of glacial ice. This would place the age in the neighborhood of 25,000 years. In this connection the age of the volcanic dust at the top of the Coulee section is interesting, since it is clearly younger than any of the other beds in the Coulee. While this may not be the original dust fall, and all data suggest that it may have been reworked to some extent, its purity suggests that it has not been moved much since it was erupted from some volcanic vent. The nearest vents are Glacier Peak, Rainier, Adams, and St. Helens. Of this quartet, only Glacier Peak and St. Helens are known to have sent out vast quantities of pumice and volcanic dust of this character. According to the most recent scientific determinations, these may have erupted as late as 5,000 or 6,000 years ago.

I am well aware that eye-witness accounts are recorded which place activity in St. Helens in the middle of the nineteenth century. However reliable these may appear to be, and there is considerable doubt on that point, it is clear that the explosive eruptions necessary for the expulsion of great quantities of pumice and dust had been terminated long before that time. Hence the determination by Hansen, given above, may be considered the more accurate.

Roughly then on present data the age may lie anywhere between 5,000 and 25,000 years ago.

STRATIGRAPHIC, MECHANICAL, CHEMICAL, AND PETROGRAPHIC ANALYSIS OF THE LIND COULEE SITE

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STRATIGRAPHY

Overlying the basalt basement is a series of highly porous unconsolidated sands and gravels. This series is divided into six beds (A to F), based on relative age, A being the youngest (fig. 8, p. 235). The lowermost distinctive member, Bed F, is a typically lenticular bed of cross-bedded gravel which includes rounded boulders and cobbles mixed with sand and silt. It is about two feet thick in most places. The rock material is nearly all basalt, although a small percentage of granite material is present.

Bed D is about eight feet thick and contains the faunal remains, the artifacts, and numerous other rock materials. It is comprised of fine and very fine sand (.105–.049 mm.) with faint horizontal bedding and no sign of deltaic structures. Excavation work revealed that this bedding dips

very slightly toward the coulee. The bedding planes do not lap over or around the material enclosed in the bed, but appear to line up as if to pass directly through them. The artifacts and bones all lie in definite dark layers. In cross-section these zones appear on the walls of the excavation trenches as thin dark lines, one to two inches thick, against a light background. The dark material is apparently carbonaceous, perhaps the carbon residue from burned bones and other sources. The percentage of the organic material was not measured, but during the cleaning process for removal of iron oxides from the sand, these artifact zones indicated a very high percentage of organic material, as compared to the sand matrix and to the other beds. Within Bed D, but not distinctly associated with the dark bands, isolated rounded basalt boulders are found. Their origin is in question. Suggestions as to the origin will be discussed below. The bed is also characterized by so-called vertical clastic dikes. The dikes may have been formed in two ways: (1) by ice melting within the bed, releasing clastics, and (2) by solidification of the porous sand from freezing, with subsequent contractional fracturing. It was the writer's observation that Bed D becomes quite solid when frozen.

Above Bed D, and quite distinct from it, is Bed B. This bed shows no stratification. In fact it appears to have been considerably reworked. In most places it is three to four feet thick. Like Bed F it is made up of sand particles. In this case the grains are somewhat smaller than the sand in Bed D (.049 mm.–silt). The suggestion of reworking is very apparent in many places. It would seem as though selective sorting has taken place. The bed as a whole is darker in appearance than is Bed F. No remains whatsoever have been found in this bed. The contact between D and B is clear and distinctly unconformable. Although lateral correlation is difficult in tracing out the beds, in at least one sequence, the contact between what might be D and B equivalents is seen to be a caliche zone. This possibly illustrates a period of exposure for the time lapse between B and D. In fact the possibility of the removal of a caliche zone between D and B seems not improbable.

Bed C is a heterogeneous mixture of gravel (fairly well sorted), sand (several sizes), and remains of vegetation. At the site location it occupies what is apparently a stream meander scar, cut in against Beds B and D. It is seen to lie unconformably above Bed D at the site location. Bed C is also found lapping up on Bed B (see fig. 8). Bed C varies considerably in thickness as it is primarily a lens at the site location. The rock material in it are, for the most part, well-rounded pebbles.

Overlying C and B is Bed A, an unstratified layer of light brownish material. There is some variation in thickness, the average being about two feet. It is well sorted and is of silt size. This bed is not nearly as compact as any of the others. Erosional agents have undoubtedly modified Bed A to great extent owing to its inherent characteristics: lightness and grain size. It is probably of aeolian origin.

Within depressions of Bed B are lenses of light gray volcanic ash not over one foot thick. Aeolian reworking of both Bed B and the ash has in some places redistributed them with materials from Bed A overlying some of the lenses. However, these anomalies are discernible, as the ash content of the reworked material can readily be seen.

Analyses

Mechanical Analysis.—A mechanical analysis of the beds was made in order to observe sedimentation changes across the contacts. The analysis is based on the United States Department of Agriculture sediment size classification.

Although mechanical analyses are by no means conclusive evidence, they do give some indication of the transporting media. The first point that can be made in this instance is that aeolian action as a transporting agent was at a minimum, except in the case of Bed A whose character itself suggests this type of transportation. Goldman (1915: 272) says that ". . . 0.034 is the diameter of the smallest rounded grain found in known windborne material."

As for the remainder of the beds, the high percentage of fine and very fine sand in Bed D indicates water of sluggish nature. The very low percentage of silt size material supports a contention that the water was agitated somewhat. It does not seem likely that silt or clay will be deposited in agitated waters. Nor does it seem likely that eight feet of medium and fine sand, well sorted, will be deposited by a swift-flowing stream. Therefore, some of the possible bodies of water which might have deposited Bed D are: a large, slow-moving stream, an agitated pool, or an agitated lake.

The analysis of Bed D, the artifact bed, illustrates an interesting, but not entirely unexpected

TABLE 4

MECHANICAL ANALYSIS OF BEDS BY PERCENTAGE

Beds	Size of grains					
	Above 1 mm. Very coarse sand	1–0.5 mm. Coarse sand	0.5–0.25 mm. Medium sand	0.25–0.105 mm. Fine sand	0.105–0.049 mm. Very fine sand	Below 0.049 mm. Silt and clay
A silt						
B	2	19	13	52	13	trace
C	66	5	trace	18	10	2
D (including zones)	1	1	8	45	43	2
D_3 (above artifact zones)	trace	trace	trace	24	64	11
D_2 (artifact zones)	2	3	3	37	53	2
D_1 (below artifact zones)	3	18	49	26	4	3
F gravel						

point. The bed becomes finer in grain size towards the top. This can be seen clearly from the percentages of medium sand and silt. This evidence might be used to illustrate that the bed was a unit of deposition, not interrupted for artifact deposition. However, as stated before, this mechanical analysis is not at all conclusive, and to illustrate properly whether there is any really significant change in sedimentation across the artifact zones, a great many samples should be carefully analyzed under better control than was possible here.

CHEMICAL ANALYSIS

One chemical analysis of the beds was made. The percentage of $CaCO_3$ was calculated from at least six randomly selected 10 g. samples from each bed. The results obtained were highly inconclusive as far as positive evidence is concerned. No outstanding abnormal conditions were evident. Bed B which yielded the highest per cent of $CaCO_3$ was expected to have just that, but the amounts were not high enough to justify any conclusions as to the proposed missing caliche zone at the base. The artifact bed's extreme lowness in $CaCO_3$ can be interpreted in at least two ways. First, this may be quite normal to present day conditions, and second, the low percentage of $CaCO_3$ indicates a cool environment not amenable to the deposition of $CaCO_3$.

TABLE 5

CHEMICAL ANALYSIS OF BEDS

Beds	Percentage of $CaCO_3$
A	No calculation
B	3.41
C	2.95
D	0.31
D_2	0.27
F	No calculation

The sands in the coulee floor were tested for $CaCO_3$ with a result of 0.05 per cent. What the relationship might be to the beds, from which the sands undoubtedly came, is not apparent. Further calculations from more sampling might yield better results more indicative of the possible relationships.

PETROGRAPHIC ANALYSIS

All of the beds excepting Bed A were examined under petrographic and binocular microscopes. The petrographic examination was made on samples from the very fine sand and silt portions which had been separated on the basis of bromoform with a specific gravity of 2.85 into light and heavy fractions. This separation was made in order to observe heavy mineral suites. Refractive oils placed on gelatin encased grains, according to the method proposed by Jeffries (1954: 402), served as the means of examination.

The ash lens was found to contain a very high percentage of dacitic or andesitic glass. This confirmed its megascopic identification as being of volcanic origin. The degree of weathering of the feldspars observed was negligible.

Bed C examination was conducted on a correlation between petrographic and binocular microscopes. This relationship was used since Bed C is assorted gravel. The pebbles were nearly all basalt, and the fine sand and silt had an abnormal percentage of granitic material (as compared to pebbles). The granite minerals, apatite, zircon, epidote, etc., were observed from this bed. They were only identified in extremely small amounts under the binocular microscope. It appears that basic rocks (basalt—andesite?) makes up the

pebbles, but in fine fractions, granitic material can be observed in Bed C.

The pebbles are well rounded and do not show much weathering. Nor do the individual minerals of the granitic material. In fact, none of the rock matter in any of the beds appears to have undergone a great deal of weathering. Apparently most of the weathered material was eliminated during transportation, and weathering has not proceeded to any degree at the present location of the sediments.

Bed B is comprised mainly of basaltic ingredients. Plagioclase feldspar is an important constituent. This is not surprising since a great many of the basalts within the immediate vicinity contain plagioclase porphyries. Olivine is also an important mineral, present in more than trace amounts. Quartz is relatively rare. The sand grains do not exhibit roundness. They are, for the most part, sub-angular.

From these observations it might be stated that Bed A is somewhat limited in source distance. Since it appears to be reworked material, the statement that it is most likely the result of local basalt erosion does not seem illogical.

The change in rock material across the contact between Bed B and Bed D is at once noticeable and outstanding. Where Bed B is mostly basaltic matter, Bed D is granitic. Quartz is prominent along with other granitic minerals such as epidote, zircon, and apatite. Magnetite occurs in many instances. It is quite fresh appearing, as are the other minerals. Roundness is quite limited. Only an occasional grain is found well rounded.

An interesting and perhaps revealing mineral occurs quite profusely in Bed D and especially in the artifact zones where it makes up a relatively high percentage of the material. The mineral is hematite in the form of red ocher. Red ocher is known to have a valuable meaning to ancient cultures. Its presence in this particular horizon is completely in accordance with the most logical expectations of an anthropological site. On at least one of the isolated boulders found in Bed D, red ocher occurs as fillings in the outermost vesicles, as if plastered there rather than deposited. An odd point about the red ocher grains is that they are all quite well rounded, in relation to the granitic material. One explanation of this is that the grains are oolitic in nature and were formed locally. Another explanation would be that although red ocher would not survive severe transportation, the grains were transported, and became rounded in the process. A third explanation is of course that the roundness is due to wearing from human hands and deposition occurred within a short distance from where they are found, if not right at the spot.

The gravels below Bed D are similar to the gravels in Bed C, but with an important difference in size. There are many cobbles at this level, nearly all of which are basalt or at least the basic rocks, indigenous to the region. Granitic materials are at a minimum.

The results of the petrographic work may serve as interpretations of the beds. Bed F, a basaltic gravel, is derived from the rocks in the region by a turbid flow of water. The lack of granitic matter suggests that the waters were not distant in source and could therefore not obtain granite matter to transport. Bed D which shows such a large amount of acidic minerals undoubtedly must have been formed from sediments which were carried for some distance. The low degree of rounding suggests suspension, if distance is far, thus calling for a large amount of water. Or ice may have been an important factor in the transportation of granite remnants with later destruction forming the sediments for Bed D.

Bed B appears to have been formed from materials, the bulk of which were obtained locally—that is, within the basaltic province. The reworking could have been done in part by the wind although frosted translucent grains are very few. If somewhat agitated waters are prevailed upon to serve as the reworking mechanism, then it is quite likely that the water was not far removed from its source. The evidence that can be cited is the low per cent of granitic materials, most of which may have come from Bed D or its equivalent in the region.

Bed C, the gravel, represents the flow of turbid water. The well rounded pebbles illustrate a good deal of abrasive wear and since abrasion occurs best on bed rocks, it appears that transportation was of some distance. Bed-rocks are poorly exposed at present in the region, and there is no reason to assume that the basalt basement in the area could have served as an abrasive power. Basalt further away, up gradient, from the site location is the best explanation for the gravel of Bed C.

VERTEBRATES AND MOLLUSCA FROM LIND COULEE, WASHINGTON

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INTRODUCTION

For many years fossil material has been removed from Lower Lind Coulee by local citizens, field-tripping students and more serious collectors. Each spring's flood waters down the normally dry coulee are followed by a flood of bone pickers eager to see what has been torn from the steep walls and is lying about the coulee floor. As this floor is soon to be inundated by water returning from irrigation ditches to O'Sullivan Reservoir, the National Park Service has sponsored an investigation of the fossil content of the coulee banks. At the time of this study the coulee floor was under water west of Range 28 E.W.M. and thus many possible collecting areas were virtually inaccessible.

The author spent two months of the summer of 1952 examining the sediments exposed in Lind Coulee along its meandering course in Grant County. The fossil finds of this study, along with previous finds, are reported here. It is unlikely that the lists are complete. New material will continue to appear and specimens taken from the area previously have probably not all been reported. It is hoped that this paper may serve to summarize present knowledge of the fossil fauna of this area and will prompt those with collections from the coulee to report their finds with adequate locations to interested scientists at the state's colleges and universities.

Acknowledgment is due Professor George Beck of Central Washington College of Education for

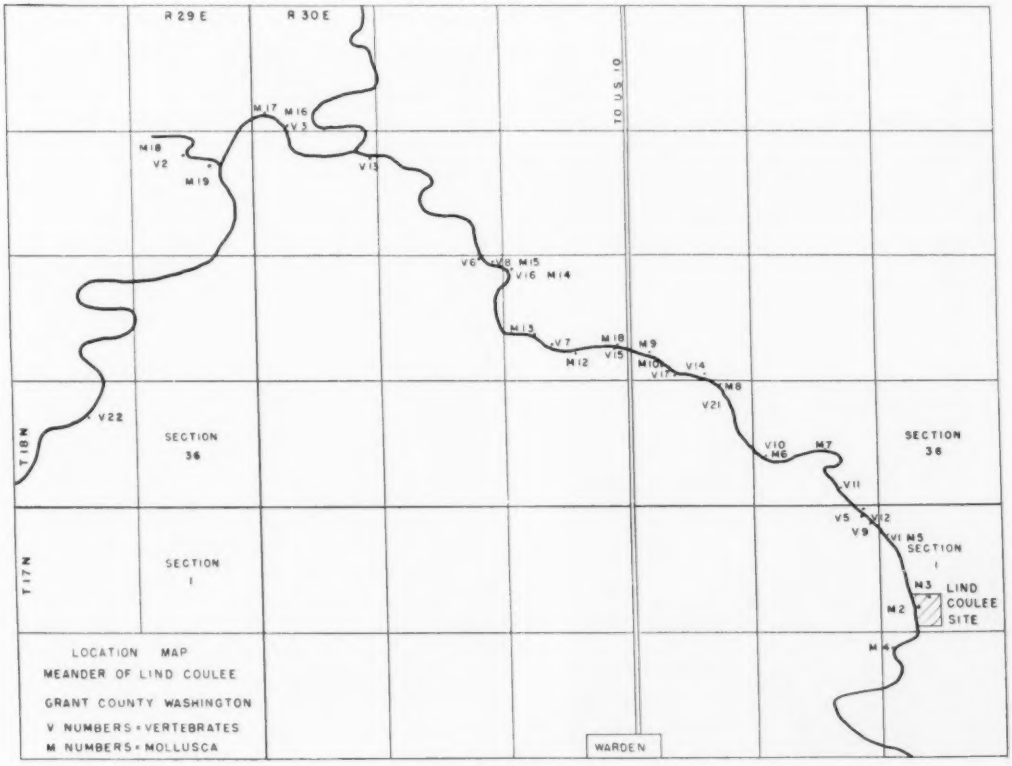


FIG. 29.

lists of his collections and identifications. Mammals of this study were identified by Dr. Theodore White of the Smithsonian Institution River Basin Surveys. Maps were kindly furnished by the Ephrata and Warden offices of the Bureau of Reclamation, Columbia Basin Project. Mollusca were photographed at the University of Washington. The author is indebted to Lee G. Nering for details of site stratigraphy for his unpublished honors thesis, State College of Washington, 1952.

GEOLOGIC SETTING

The glacial and postglacial history of the Columbia Basin is by no means clear at the present time. Various interpretations have been presented by such authorities as Bretz, Allison, Hobbs, and Flint (Bretz, 1919 *et seq.;* Allison, 1933; Hobbs, 1947; Flint, 1936 *et seq.*). The essentials of these various versions are summarized by Lupher (1944). For further discussion of the adequacies of these proposals, which is beyond the scope of this study, the reader is referred to Dr. Campbell's discussion of the geology of the site and surrounding area (pp. 260–262).

It is this author's opinion that the sediments exposed in Lind Coulee in Grant County may be

FIG. 30. Clastic dike.

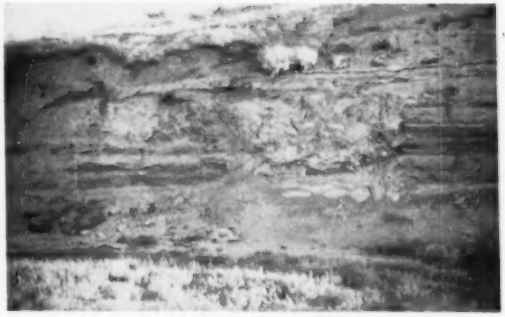


FIG. 31. Clastic dike.

referred to the Touchet beds of Flint (1938: 493–500). Although this unit, representing a lacustrine environment, was not carried north of the Saddle Mountains by Flint, it seems reasonable to suppose that similar sedimentary conditions prevailed immediately to the north in Grant County. As Flint points out, the Touchet is not present in just the part of the basin where deep water should be recorded but is more or less obscured by windblown veneers or has been washed off the underlying gravels around the perimeter.

Certain similarities between the Touchet and the sediments here considered may be mentioned. The most striking of these is the presence in both units of numerous clastic dikes. Lupher (*ibid.*) in describing the clastic dikes of the Columbia Basin, found them typical of the Touchet. The two types of dikes observed in the coulee are illustrated in figures 30 and 31. In each case the dike material is much finer than the enclosing sediments. Resting between two large boulders and in the top of the clastic dike of figure 31 was the worn humerus of an elephant or mastodon, specimen number 13.18.

Where exposures are good (twenty to forty feet) the sediments are seen to be massive silt to fine sand layers alternating with thin sand layers. Where exposures are poor, only the top windblown or reworked fine sands are evident. Fig. 32, exposed in Weber Coulee at its intersection with Lind Coulee, illustrates the lapping over relationship of the top fine sands to the rhythmically bedded silts and sands. Tracing beds from exposure to exposure is usually impossible as the action of the pre-coulee stream and its various meander scars has removed material from alternate sides of the present coulee cut. The north-south excavation made for the Columbia Basin Irrigation Project siphon in the northeastern portion

of T 17 N, R 30 E cuts across Lind Coulee and exposes a complex set of beds showing cuts and fills, cross bedding, clastic dikes and sediments varying from coarse gravels to silts. These rocks abut against a cliff of basalt on the north side and thin out to the south as if deposited on a slip-off slope. The channel seems to parallel the present coulee's east-west trend.

At no place was any contact found with what could be considered Palouse soil. Flint (1936: 494) has found the Touchet overlying the Palouse. The bottom contact was in all cases either a coarse gravel or basalt.

A sedimentation study was not made and thus the similarity between those beds and the Touchet can be based only on gross appearance. The beds are bright and with few exceptions free from iron stain and have the silky texture of the Touchet proper. Further study is needed to establish definitely this northward extension.

If these sediments may indeed be referred to the Touchet, the fossil content of that unit would be greatly increased. At present only the diatoms *Melosira granulata* (Ehrenberg) Ralgs, *M. ambigus* (Grunow) Muller and *M. solids* Eulenstein have been listed from the Touchet.

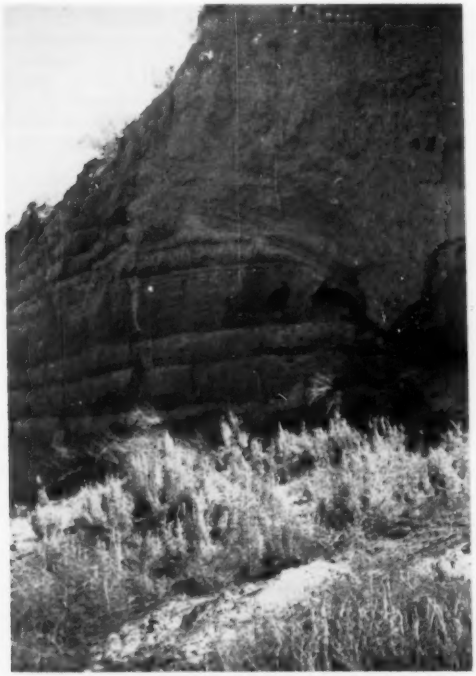


FIG. 32. Fine sands overlapping rhythmically bedded sands and silts near intersection of Weber and Lind Coulees.

STRATIGRAPHY OF THE SITE

Four units may be recognized at the site (*cf.* fig. 8, p. 235). These are the following: F—a lenticular bed of cross-bedded gravel about two feet thick lying on basalt and containing boulders and cobbles. D—fine sands and very fine sands with dark horizontal streaks, eight feet thick and comprising the artifact zone. Most of the finds were in the dark bands which have a high carbon content. Thin coarse sand layers and some coarser lenses are also present in this unit. Rounded isolated boulders—presumably ice rafted—were encountered during excavation. One of these boulders was over three feet in long dimension—which oddly enough was the vertical direction. B—unconformably overlying D are fine sands and silts showing no stratification. A—the remaining beds of the exposure are fine grained sands to silts presumably reworked or eolian with high volcanic glass content. Pockets of pumicite lie in beds A and B.

The age implications of these beds are vague but rather wide limits for the artifacts can be established. The upper limit is that of the ash falls recorded in bed B. The latest known major eruption capable of supplying the volume of ash observed was that of Glacier Peak some 6,000 years ago. Thus a minimum age is established. The maximum age is more difficult to determine. The materials of Bed D appear from analysis to have been transported over some distance by water. The drainage conditions necessary for this long transportation would have existed during the Wisconsin (Spokane) glaciation or the retreat involving ponding of melt water, 20,000 to 30,000 years ago.

These figures seem rather high. One might conjecture, considering the great number of bison finds, that the time in question was between 15,000 and 8,000 years ago—the grass maximum of Hansen's chronology (Hansen, 1947). If ponding was prolonged after the glacier's retreat, the Touchet beds could approach this age range.

The environmental picture presented is that of a series of lakes and ponds with shifting connecting channels draining to the southwest into a large lake. It is the author's opinion that the site represents sedimentation in a small lake or pond near an occupied area which was flooded occa-

sionally and habitation interrupted with later reoccupation at low water.

PALEONTOLOGY OF THE SITE

Appearing in Table 6 is a list of fossil material removed from the site during the years 1949–1952 by Richard Daugherty and party. It will be noticed at once that *Bison* form the highest percentage of remains. The disarticulation of the forms would not in itself indicate human handling but the gathering together of so many parts of so many different animals suggests either long transportation or human organization. The bones show little wear, eliminating the former consideration. It should also be pointed out that all forms except possibly the pocket gopher have some human value—either as food or for their pelts.

The genera represented give no exact dating to the deposit, ranging as they do at least through Pleistocene and Recent. Skinner and Kaisen list the range of subgenus *Bison* as Late Pleistocene (middle of the Illinoian) to Recent (Skinner and Kaisen, 1947). As these authors have shown, it is impossible to determine subgeneric identities on the basis of tooth characters alone. The finding of a skull identified as *Bison* (*B.*) *bison bison* east of Hooper on Willow Creek in Whitman County, Washington, from probably late-Pleistocene deposits extended the range of that species into Washington. It is thus possible that the site bison are plains bison.

Concerning the other genera present in the site vicinity, the following generalizations might be made based on the work of Dalquest (1948). These interpretations are limited by the general lack of information of the Northwest's Pleistocene fauna and age relationships of deposits. The pocket gopher (*Thomomys*) was present in the Columbia Plateau and Cascade Mountains prior to Wisconsin time and it is thought that the former area was occupied by the racially distinct *devexus* type of *talpoides*, which was able to survive there. The muskrat (*Ondatra*) was represented by an adaptable race in the Columbia Basin which has since become widespread. The fox now present in eastern Washington is thought to be a post-Wisconsin immigrant from the Blue Mountains of southeast Washington and a member of the Rocky Mountain fauna. The fox find at the site, presently considered late Wisconsin in age, indicates that this hypothesis should be revised. The badger (*Taxidea*) has been a long-time resident of the Columbia Plateau. The author can testify to the squatter's rights attitude of one hairy fellow who objected to the disinterment of his ancestors. Pleistocene remains of the badger have been found in Adams County, about twelve miles north of Kahlotus associated with a 73 per cent extinct fauna suggested as characteristic of the first interglacial by O. P. Hay (1927). The presence of *Mephitis* (the skunk) is interesting in this now skunkless area. The idea that the four subspecies now extant in Washington were isolated during the Pleistocene in parts other than the central Columbia Basin or entered later from the Rocky Mountain or Great Basin fauna may have to be revised. Or it may be that the Lind Coulee Pleistocene forms became extinct.

TABLE 6

FOSSILS OF THE SITE

Identification	Member
Birds	
Anas crecca (Green-winged teal)	humerus
Young bird (Identification uncertain)	humerus
Egg shells	
Large goose ?	
Mammals	
Bison sp.	upper molar (2), 1st lower Pm, 2nd lower Pm, 3rd lower Pm, incisors (3) jaw fragments and articular portion of lower jaw, jaw fragments, maxilla (immature), orbital, periotic, scapula (2), scapula fragments, neural arch of lumbar vertebra, neural arch of dorsal vertebra, dorsal vertebra, vertebral fragments, sygapophysis, rib fragments, acetabulum, cuboids (2), 1st phalax (3), 2nd phalax (2), 3rd phalax (4), metarsal (2), metacarpal (2), metacarpal-distal (2), sesamoid, carpal, ulna, humerus, tibia-distal.
Deer or antelope	Glenoid portion of scapula
Thomomys (Pocket gopher)	palate (2), lower jaws
Ondatra (Muskrat)	jaws
Fox	pelvis
Taxidea (Badger)	lower jaws
Mephitis (Skunk)	right maxilla
Rabbit ?	sacrum
Rodents	tibias (2), tarsus, incisor, metapod.
Carnivores	scapula, metapod, 1st phalanx

In summary it may be stated that although the fauna of the site presents a Recent rather than typically "Pleistocene appearance," the present lack of knowledge of Pleistocene ranges of the animals involved should be taken into consideration and the evidence presented elsewhere as to the age of the site given more weight. The assemblage presents the climatic implications that except for the support of bison herds, the surroundings could not have been so barren as now.

PALEONTOLOGY OF LOWER LIND COULEE (EXCLUSIVE OF THE SITE)

Table 7 lists those specimens collected by the author in 1952 and those collected over a number of years by George Beck, Central Washington College of Education. The numbers refer to the location map; those following the decimal point

TABLE 7

VERTEBRATES OF LOWER LIND COULEE

Number	Identification	Member
1.056	Anas sp.	
2.02	Clenmys ? (Turtle)	Carapace fragments
3.30	Snake	Vertebrae, ribs, jaws, skull bones
4.0	Bison sp.	Molars (float in coulee floor)
5.08	Bison sp.	Molars (3) and Pm (2)
5.068	Bison sp.	Head of femur
6.09	Bison sp.	Sacrum and ilium
7.03	Bison sp.	Pelvis
8.15	Bison sp.	Scapula
9.10	Bison sp.	Acetabulum
10.056	Bison sp.	Radius
11.10	Bison sp.	Metatarsal
12.06	Cervus canadensis	Dorsal vertebra
13.18	Elephant or mastodon	Humerus
14.03	Elephant or mastodon	Cervical vertebra
14.01	Microdipodops ?	Skeleton
12.02	Microtus sp.	Teeth
14.06	Citellus sp.	Skull
15.06	Citellus sp.	Skull
3.25	Citellus sp.	Skull
3.36	Peromyscus	Maxilla, skull, jaw bones
16.10	Rabbit	Jaw
3.25	Thomomys	Skull
17.08	Bison ??	Ribs
0.00	Elephas ? or Mastodon ?	Large bone fragment in siphon excav.
(The following are finds of Prof. George Beck)		
Near 12	Elk, Bison, Canid bones	
18–20		
21	Elphas	
22	Camelids—presumably intermediate in size	Pliaachenia—large and
23	Felid (large)	Section 6, T 17 N, R 29 E

FIG. 33. *Anodonta* cf. *A. californiensis*. No. 18.02. Width, 68 mm. Length, 39.5 mm.

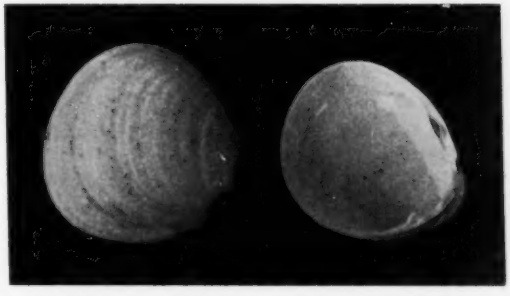


FIG. 34. *Pisidium* cf. *P. contortum* Prime. No. 7.05. Width, 9 mm. Length, 8.5 mm.

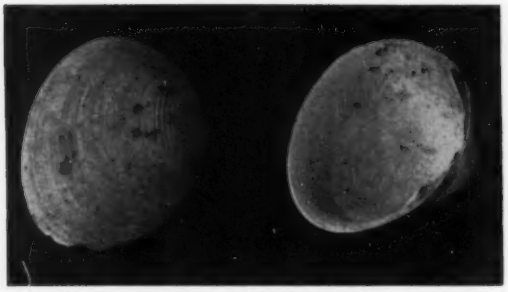


FIG. 35. *Sphaerium dentatum* Haldeman. No. 19.04. Width, 8.5 mm. Length, 6 mm.

FIG. 36. *Helisoma trivolvis trivolvis* (Say). No. 17.20. Width, 24 mm.

indicate the number of feet above the coulee floor the find was secured. Some of the animals are discussed in the following paragraphs and again the interpretations are based on Dalquest (1948).

The *Bison* teeth (No. 5.08) as pointed out above are not diagnostic. The alveolar length of M1–M3 is 94 mm. and falls within the range of *Bison* (*B.*) *bison bison* of 82 to 98 mm. *Bison* (*B.*) *bison athabascae* and *Bison* (*Simobison*) *antiqus* are also possibilities considering previous finds in southeastern Washington and Oregon.

The elk vertebra (No. 13.06) was found associated with bone fragments and Bison? ribs. These bones appear to have been charred and the nearby area was excavated with hope of finding a site. No artifacts were found. Remains of elk have been reported from the northern part of the Columbia Plateau associated with human artifacts. Although the Columbia Plateau no longer supports an elk population, it is thought that elk had entered the area from Siberia at least by Wisconsin time and were able to establish themselves.

The necessarily vague determination of specimens No. 14 and No. 15 as mastodon or elephant is most unfortunate for dating purposes. *Mammut americanus* is present in the Ringold and fragments of proboscidean teeth attributed to this species by Hay (*op. cit.*) have been found at Washtucna Lake in Adams County. Most finds of *M. americanum* have come from late-Pleistocene deposits. Hay reports *Elephas columbi* from Franklin, Whitman, and Walla Walla counties.

Microtus pennsylvanicus probably occupied northeastern Washington prior to Wisconsin time and it is thought that most of them were eliminated. One group was able to maintain itself in the Columbia Basin and developed into *M. pennsylvanicus kincaidi*. The site form may be this species. *Citellus* inhabited the area during at least all the Wisconsin. *Peromyscus* species and subspecies show a complicated picture of migrations, competitions and extinctions resulting from the ice invasion and retreat.

The finding of horse teeth referable to *Pleisippus shoshonesis* near Othello and on the banks of Moses Lake has led Professor George Beck to the

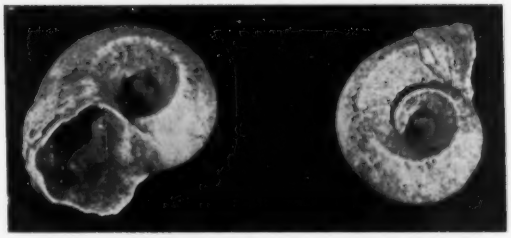


FIG. 37. *Helisoma* cf. *H. antrosus antrosus* (Conrad). No. 18.02. Width 12 mm. (right).

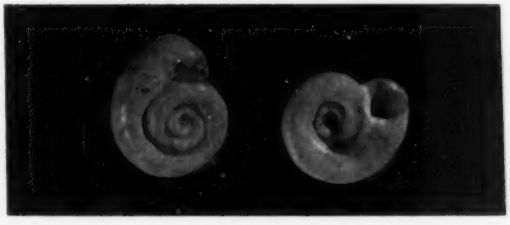


FIG. 38. *Gyraulis* cf. *G. vermicularis*. No. 6.06. Width, 6 mm. (left).

FIG. 39. *Valvata humeralis californica* Pilsbry. No. 2.06. Width, 4.5 mm.

FIG. 40. *Menetus* sp. No. 18.06. Width, 5 mm. (right).

conclusion that the Ringold extends into this area. He also considers that these finds along with the five-molared camel of the coulee indicate an upper Pliocene age for the material in the lower coulee. The Ringold proper is considered upper Pliocene. The author is not prepared to defend this thesis but it may be that sediments older than the Touchet are present in the lower extent of the coulee. The camel find (see fig. 29) in this area would indicate a pre-Wisconsin age according to the known time range of camels. But there are camels and camels and this interesting problem of age remains unsolved.

The fauna of the site and the coulee east of Range 29 E has little in common with that of the Ringold formation at White Bluffs, lacking as it does *Rangifer, Megalonyx, Platygonus, Equus,* and possible *Mammut americanum.* If the fauna of the Ringold is actually "middle or rather late Pleistocene" as suggested by Strand and Hough (1952), the aspect presented by the fauna considered here is that of still later Pleistocene bordering on the Recent. But as it has been pointed out, the lack of definitive members of the majority of specimens makes any accurate dating impossible.

INVERTEBRATE PALEONTOLOGY

Freshwater pelecypods and gastropods are rather common in the sediments exposed in Lind Coulee. The present actual knowledge of ranges and climatic implications of Pleistocene and Recent freshwater species is very limited. Designating biologic species and subspecies for these fossil forms would seem most hazardous considering the nature of freshwater gastropod specia-

TABLE 8

MOLLUSCA

	1.08	2.06	3.15	4.05	5.06	6.06	7.05	8.01	9.05	10.05	11.06	12.03	13.04	14.10	15.15	16.25	17.20	18.02	19.04
Pisidium cf. *P. contortum* Prime	x		x	x			x		x			x	x	x			x	x	x
Sphaerium dentatum Haldeman															x	x		x	x
Spaerium sp.				x															
Anodonta cf. *A. californiensis*																		x	
Vallonia cf. *V. alba* Sterki	x		x	x														x	
Pupa cf. *P. muscorum* Linn.																		x	
Helisoma trivolvis trivolvis (Say)					x	x					x					x	x		
Helisoma cf. *H. antrosus antrosus* (Conrad)																		x	
Gyraulis cf. *G. vermicularis* (Gould)	x			x		x	x	x	x		x		x	x		x	x		
Menetus sp.						x			x		x				x				
Valvata humeralis californica Pilsbry	x	x		x			x					x	x	x					x
Succinea haydeni Binney											x								
Succinea avara Say		x						x				x		x		x		x	
Physa sp.						x					x								
Stagnicola (Galba) palustris (Muller)	x	x	x	x		x	x		x	x	x	x	x	x				x	
Stagnicola (Galba) palustris ? (narrow form)					x														

tion. The author has compared the coulee finds with recent forms and the identifications should be considered as "form" species and not biologic and many are designated *cf.* if a positive identification seems unwarranted. As the Pleistocene and early-Recent fauna of the Northwest become known, it may be possible to delimit species and ranges with more reality. Successful use of freshwater mollusca in the Midwest Pleistocene correlations gives hopes that in the future these forms may serve a similar purpose here, providing that their identifications and consequent taxonomy do not become so confused as to discourage workers.

All specimens are in the Department of Geology Paleontology Museum, University of Washington numbers No. 04000 to No. 04100. Species are listed in table 8 with location numbers referring to the location map.

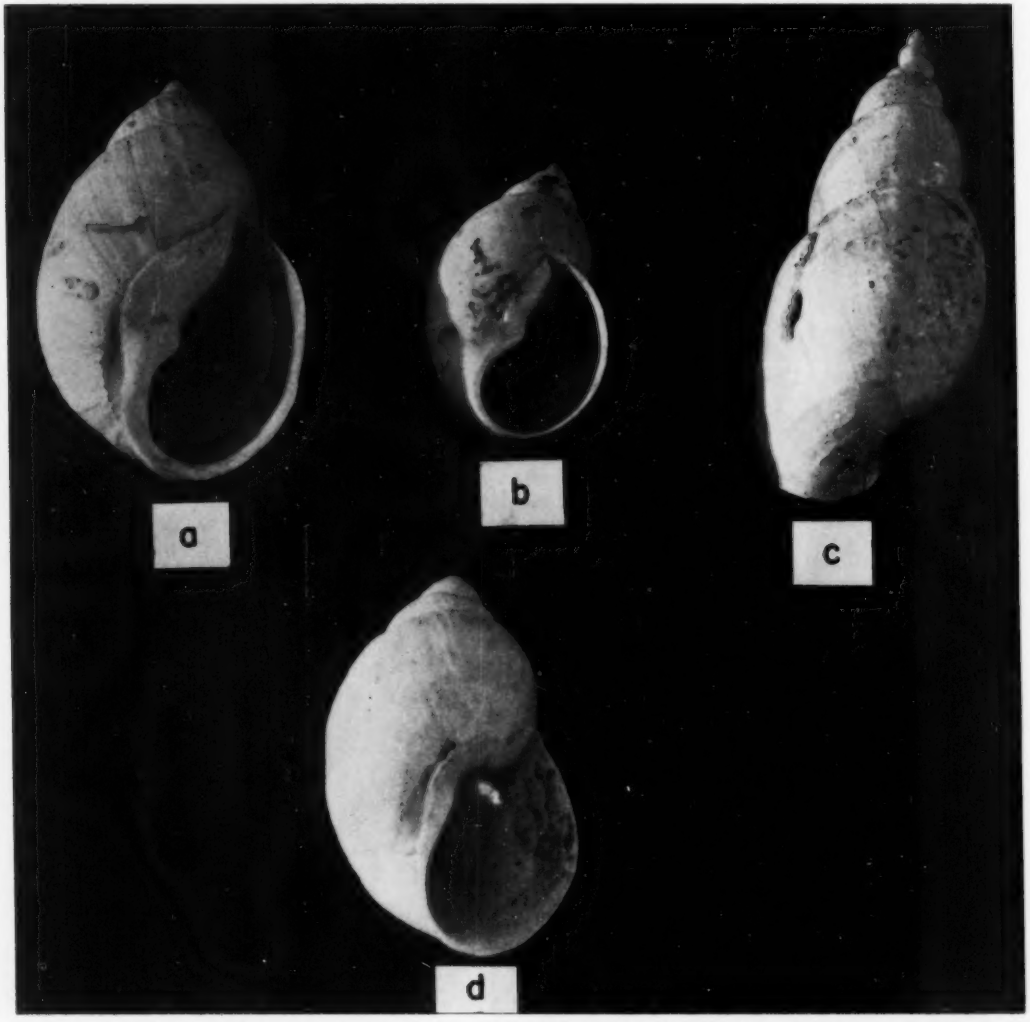
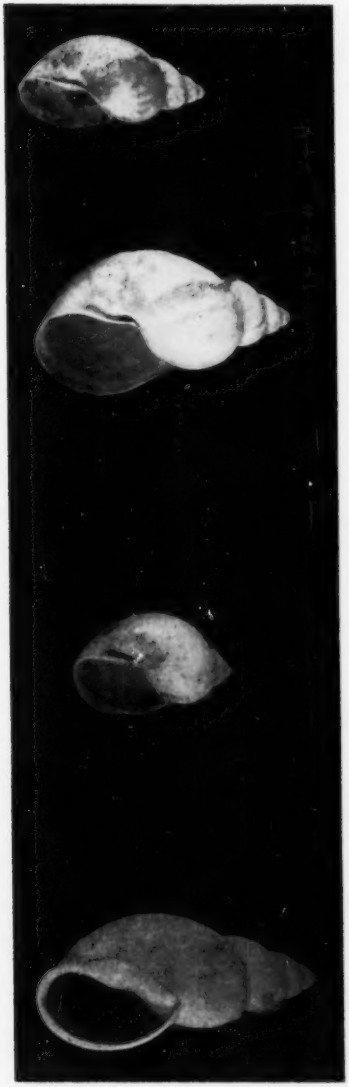


FIG. 41. *Stagnicola* (Galba) *palustris* (Muller). *a.* No. 6.06. Width, 11 mm. Length, 25 mm. *b.* No. 11.06. Width, 7 mm. Length, 17 mm. *c.* No. 11.06. Width, 8 mm. Length, 21 mm. *d.* No. 16.25. Width, 9 mm. Length, 19 mm.

As will be seen from table 8, the most common forms are *Gyraulis* cf. *G. vermicularis, Pisidium* cf. *P. contortum, Valvata humeralis californica* and the forms referred to *Stagnicola* (*Galba*) *palustris*. Other forms are much less numerous both in location and number at location. It is possible that the *Lymnaeas* might with further study and more material be split, but they are at present placed with *palustris*, which typically shows great variability in size and spire height. The heaviness of the columella plait also varies but in no particular direction paralleling other variations. The slender form found only at one location is probably at least a varietal difference



No. 7.05
Width, 6 mm.
Length, 11 mm.

No. 7.05
Width, 9 mm.
Length, 16 mm.

No. 7.05
Width, 6 mm.
Length, 10 mm.

Narrow form
No. 5.06
Width, 6 mm.
Length, 18 mm.

FIG. 42. *Stagnicola* (Galba) *palustris*.

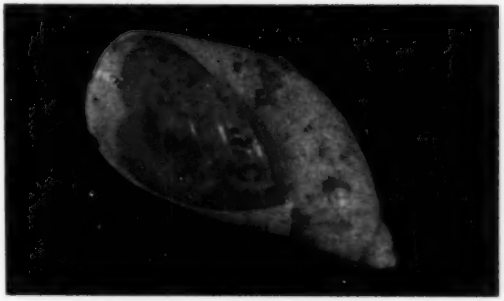


FIG. 43. *Succinea haydeni* Binney. No. 18.06. Width, 7 mm. Length, 15 mm.

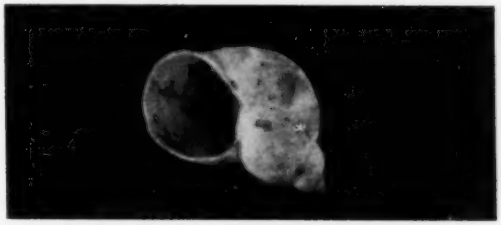


FIG. 44. *Succinea avara* Say. No. 8.01. Length, 6.5 mm.

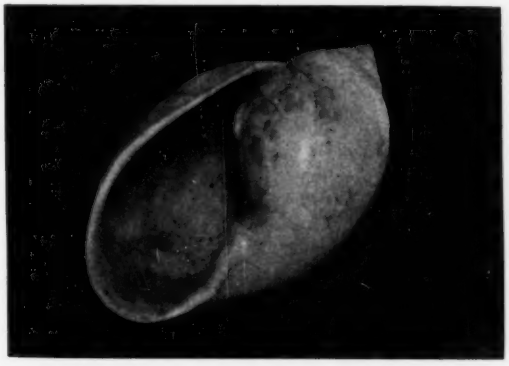


FIG. 45. *Physa* sp. No. 11.06. Width, 11 mm. Length, 17 mm.

FIG. 46. *Physa* sp. No. 11.06. Length, 3.5 mm.

but the number of specimens does not justify such a designation.

SUMMARY

Although Lind Coulee could not be described as a rich collecting area, its fossil content undoubtedly will be of help in unraveling Columbia Basin events in Pleistocene and Recent times. Paleontology in this area is still of a pioneer nature. Conclusions of this study, although tentative, may be summarized as follows:

(1) The beds exposed in the coulee walls may be referred to the Touchet of Flint. Sedimentation studies might establish this more firmly.

(2) The age of the site is between 6,000 and 20,000 years old with 8,000 to 15,000 suggested as probable. Material in the lowest portion of Lind Coulee, west of R 30 E may be older but Pleistocene.

(3) More accurately located and better preserved materials are needed, and it is hoped that such can be obtained.

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ADDENDUM CONCERNING A LOST FRANKLIN-RASPE LETTER

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In "Some Unpublished Raspe-Franklin Letters," *Proc. Amer. Philos. Soc.* **99** (3): 127–132, 1955, I referred to a lost letter by Franklin to Raspe of May 4, 1779 (p. 131, fn. 44). Similarly, in "Three Franklin-Raspe Letters," *op. cit.* **99** (6): 397–400, 1955, I stated, ". . . Franklin apparently made only one reply (May 4, 1779, which Raspe cites), and this has been lost" (p. 400). Fortunately, this is not the case: a copy, or draft rather, of Franklin's letter has been preserved, as was kindly pointed out to me by Professor Leonard W. Labaree, the Editor of The Papers of Benjamin Franklin.

In the hope of completing in so far as possible the Franklin-Raspe correspondence the text of the letterbook copy in the Stevens Collection of Franklin Papers in the Library of Congress is hereby subjoined:[1]

M. Raspe.

Sir Passy May 4. 1779.

I received the letter you did me the honour to write by Messrs. Waitz & d'Eshen. I happen'd not to be at home when they call'd on me; and they were abroad when I went to wait on them in Paris so that I have not yet had the pleasure of seeing them;—but shall be glad of an opportunity of rendring them any Civilities in my Power on your Recommendation.—I repeat my Thanks to you for your Translation of born & Ferber's tracts, which contain a great deal of observation that may be useful to America.—I hope you are easy & happy in England; being with much Esteem.

Sir

Your most obedient & most humble Servant

The tone of the letter indicates that Franklin was ready to be courteous to Raspe, if obliged by social and perhaps political considerations, but substantiates the observation that he would never again accept him on the old footing. It is apparently the only reply Franklin made to Raspe's nine letters of that period.

[1] Credit to the Library of Congress for supplying the photostat of the letterbook copy.

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